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THE PHILIPPINE

Agricultural Review

VOL. XIX SECOND QUARTER, 1926 NO. 2

TABLE OF CONTENTS

	Page
A Brief Review of Agricultural Conditions in the Philippines and the Activities of the Bureau of Agriculture in 1925, by Stanton Youngberg	87
Variety Test of Sugar Cane at La Carlota Sugar-Cane Experiment Station for the Crop Year 1925–1926, by Silvestre Asuncion and Melquiades Medina	143
Fertilizer Test of Sugar Cane in La Carlota Sugar-Cane Experiment Station for the Crop Year 1924–1925, by Silvestre Asuncion and Melquiades Medina	145
Honey Bees and How To Raise Them, by Faustino Q. Otanes	149

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ILLUSTRATIONS

Facing page—

PLATE XXI. Graph showing production of rough rice (palay) in cavans from 1916 to 1925 88
XXII. Graph showing production of sugar in piculs from 1916 to 1925 88
XXIII. Graph showing production of coconuts from 1916 to 1925 90
XXIV. Graph showing production of hemp (abaca) in piculs from 1916 to 1925 90
XXV. Graph showing production of corn in cavans from 1916 to 1925 92
XXVI. Graph showing production of tobacco in quintals from 1916 to 1925 92
XXVII. Graph showing production of maguey in piculs from 1916 to 1925 92
XXVIII. Graph showing the number of carabaos from 1915 to 1924 94
XXIX. Graph showing the number of cattle from 1915 to 1924 94
XXX. Graph showing the number of horses from 1915 to 1924 94
XXXI. Graph showing the number of hogs from 1915 to 1924 94
XXXII. Graph showing the number of goats from 1915 to 1924 94
XXXIII. Graph showing the number of sheep from 1915 to 1924 94
XXXIV. (*a*) Individuals in a colony of Italian bees: (1) worker, (2) queen, and (3) male or drone 154
(*b*) Cells in which the individual bees are reared: (4) queen cell, (5) drone (a') and worker cells (b'), and (6) cross sections of same 154
XXXV. Immature stages of the Italian honey bee worker: (1) egg (2) larva and (3) pupa, all much enlarged 156
XXXVI. A modern beehive and parts 158
XXXVII. A diagram of a modern beehive dissected to show parts 158
XXXVIII. (1) A modern brood frame (Hoffman frame) showing parts and dimensions in inches, (2) end view of the same, and (3) top view of the ends of two frames showing dimensions and spacing 158
XXXIX. (1) End of an upper bar of a Hoffman frame showing cut (*a*) in which the comb foundation is inserted; (2) triangular piece cut from (*a*) and nailed to the upper bar to hold the comb foundation; (3) end view of an upper bar showing cut; (4) end view of an upper bar showing triangular piece in position, and (5) end bar and upper bar, the triangular piece and comb foundation in position 158
XL. Hives of Italian bees at the Singalong Experiment Station 158
XLI. (*a*) A brood comb of Italian bees 160
(*b*) A comb of Italian bees containing sealed honey. The frame is wired so as to strengthen the comb 160
XLII. (*a*) Smoking the hive prior to examining the combs 160
(*b*) Examining a comb of Italian bees 160
XLIII. (*a*) Portion of a comb showing bees and brood 160
(*b*) A glass observation hive 160
XLIV. (*a*) A frame with comb foundation 160
(*b*) Frames at Singalong resting against a hive 160
XLV. The small local bee, *Apis indica* 162
XLVI. (*a*) A hive of the small bee, *Apis indica* 162
(*b*) A swarm of small bees, *Apis indica* 162
XLVII. (1) A frame for the small bee; (2) top view of the ends of two frames 164
XLVIII. (*a*) A modern apiary in the United States 166
(*b*) Part of the factory of bee supplies and appliances 166
XLIX. (*a*) Part of the home apiary and bee supply factory 166
(*b*) Part of one of the queen rearing yards 166
L. (*a*) A honey house in one of the apiaries 172
(*b*) The bee culture laboratory of the Bureau of Entomology, U. S. Department of Agriculture 172
LI. (*a*) Beekeepers inspecting hives 172
(*b*) A beekeeper wearing a veil and a broadbrimmed hat 172

A BRIEF REVIEW OF AGRICULTURAL CONDITIONS IN THE PHILIPPINES AND THE ACTIVITIES OF THE BUREAU OF AGRICULTURE IN 1925

By STANTON YOUNGBERG
Director of Agriculture

AGRICULTURAL CONDITIONS [1]

Palay, sugar cane, coconuts, maguey, and coffee yielded, during the year under review, the largest crops ever gathered in this Archipelago,[2] but all other crops and by-products registered decreases ranging from 3 to 24 per cent as compared with the preceding year, 1924, and some suffered slight decreases, too, in the area cultivated, generally because of unfavorable weather, and the attacks of plant pests during the year and the year before.

September, 1924 and was extraordinarily dry and was preceded and followed by two months of continuous heavy rains and by floods occasioned by typhoons in and around the Islands, which conditions combined damaged about 5 per cent of the total area planted to all crops as against 16 per cent in 1924, while the prevalent plant diseases damaged this year about 2 per cent of the total area planted as against one per cent the year before.

However, the farmers found compensation in the prices for which their products were sold, for most crops were disposed of at higher rates than in 1924.

The following table shows for 1903, and from 1910 to 1925, the combined area planted to the six leading crops of the Islands—palay (rough rice), sugar cane, coconuts, abaca, corn, and tobacco, with their aggregate value since 1910; the average value of production per capita, and the average value of production per hectare. Table II shows for 1903, and from 1910 to 1925, the total population of the Islands, the area planted to the leading crops and the area per capita.

[1] To conform to the crop seasons of the different products, the crop statistics given everywhere in this report are, however, for years ending June 30.

[2] For complete statistics, see Appendix hereto.

TABLE I

Years	Area in hectares	Value	Average value of production per capita	Average value of production per hectare
1903	1,170,100	.....	.....	.....
1910	2,256,530	₱137,005,960	₱15	₱61
1911	2,148,240	152,501,510	17	71
1912	2,303,870	148,347,500	16	64
1913	2,361,480	168,633,730	18	71
1914	2,579,990	163,496,250	17	63
1915	2,522,210	159,055,330	16	63
1916	2,531,700	179,241,380	18	71
1917	2,691,410	244,179,470	24	91
1918	2,918,590	361,940,450	35	124
1919	2,974,920	458,698,580	44	154
1920	3,276,940	687,131,500	64	210
1921	3,518,590	403,258,250	37	115
1922	3,429,750	302,143,710	27	88
1923	3,495,440	380,194,710	33	109
1924	3,516,200	434,754,470	37	124
1925	3,508,140	483,712,230	41	138

TABLE II

AREA PLANTED IN HECTARES

Years	Palay	Corn	Sugar cane	Coconut	Abaca	Tobacco	Total
1903	592,766	107,980	71,885	148,245	217,810	31,417	1,170,103
1918	1,368,140	418,390	205,510	335,600	512,510	78,440	2,918,590
1919	1,381,340	430,710	200,200	373,250	515,560	73,860	2,974,920
1920	1,484,890	537,130	197,400	397,030	559,360	101,120	3,276,930
1921	1,673,380	543 830	241,340	417,960	548,090	90,980	3,515,580
1922	1,661,430	549,960	240,820	422,680	494,990	59,870	3,429,750
1923	1,675,870	557,690	227,290	456,830	513,420	64,730	3,495,830
1924	1,737,910	533,230	227,190	460,440	485,340	72,090	3,516,200
1925	1,725,500	522,380	239,470	472,050	477,110	71,630	3,508,140

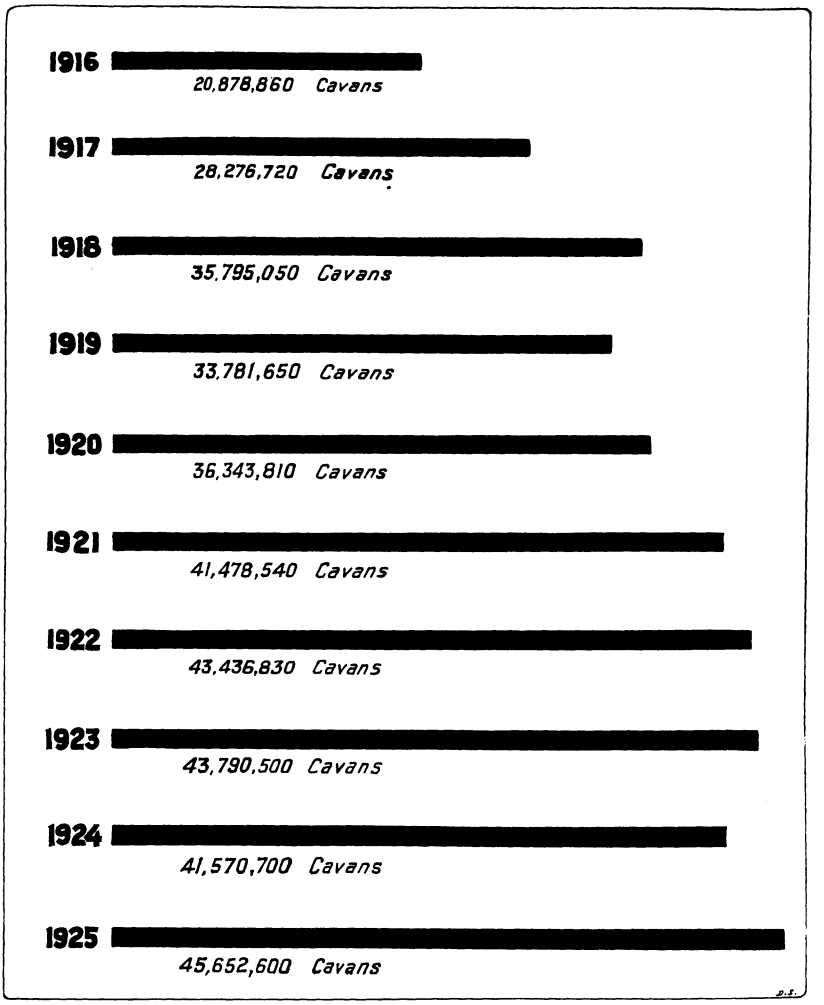
NUMBER OF HECTARES PER CAPITA

Years	Population	Palay	Corn	Sugar cane	Coconuts	Abaca	Tobacco	Total
1903	7,636,426	.0776	.0142	.0094	.0194	.0285	.0041	.1532
1918	10,314,310	.1326	.0406	.0199	.0325	.0497	.0076	.2829
1919	10,551,539	.1309	.0408	.0190	.0353	.0489	.0070	.2819
1920	10,794,223	.1376	.0498	.0183	.0367	.0518	.0094	.3036
1921	11,042,490	.1515	.0492	.0219	.0379	.0496	.0082	.3183
1922	11,296,467	.1471	.0487	.0213	.0374	.0438	.0053	.3036
1923	11,556,286	.1450	.0483	.0197	.0395	.0444	.0056	.3025
1924	11,822,081	.1470	.0451	.0192	.0389	.0410	.0061	.2974
1925	11,847,899	.1456	.0441	.0202	.0398	.0403	.0060	.2960

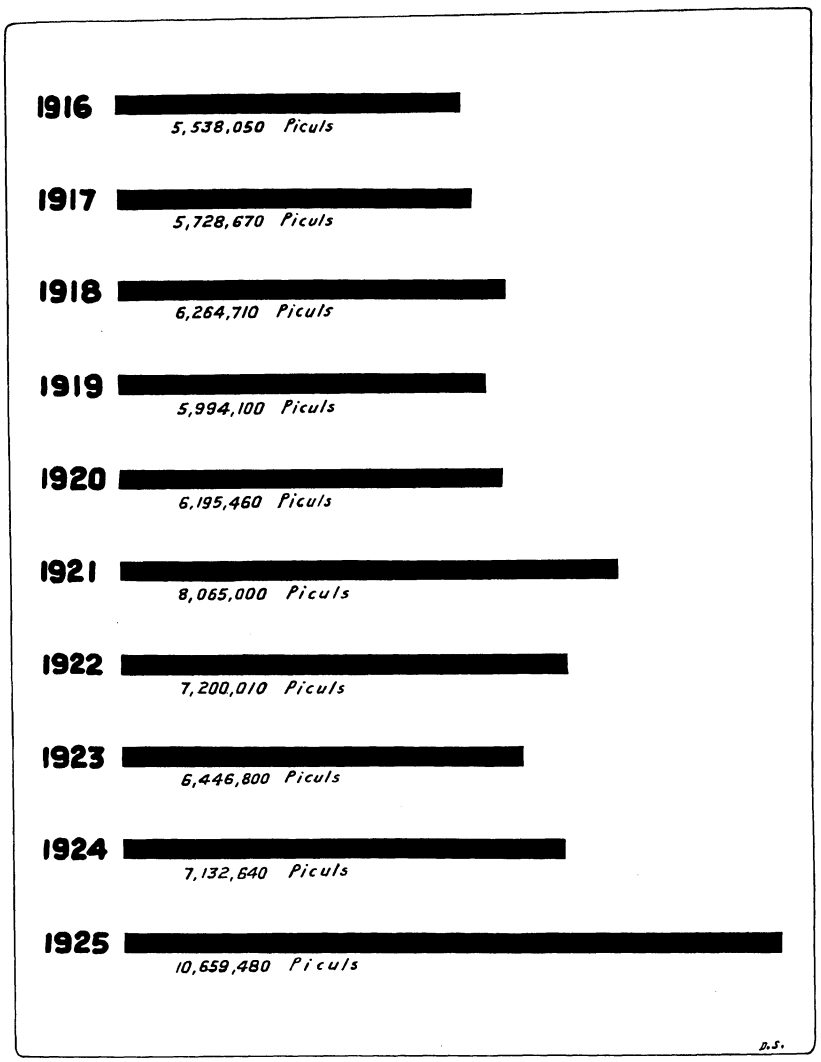
PALAY (ROUGH RICE)

Exceeding the previous record crop of 1923 by 4 per cent, 1,725,500 hectares were planted to this staple during 1925 and the yield was 45,652,600 cavans of palay valued at ₱192,179,270 in the municipal markets.

This crop was one per cent smaller in area but 10 per cent larger in yield and 11 per cent greater in value than for 1924, when the corresponding figures were 1,737,910. It would have been still larger had it not been for the destruction of many



Graph showing production of ROUGH RICE (PALAY) in cavans from 1916 to 1925



Graph showing production of SUGAR in piculs from 1916 to 1925

seedlings by extraordinary floods during July and August 1924, which seedlings could not be replaced because of shortage thereof in some cases and because of the unusual drought during September, in others. The rains of October and November, however, helped the damaged plantations considerably giving an increase in production, as stated above.

The average yield per hectare in 1925 was 26.46 cavans against 23.92 in 1924, or an increase of 11 per cent, and the average prices were ₱4.20 per cavan during 1925 and ₱4.16 in 1924. Of the total area planted, it is estimated that about 29 per cent was upland palay and 71 per cent lowland; and the corresponding yields were 10,916,600 and 34,736,000 cavans.

Sulu, Masbate, Palawan, La Union, Nueva Vizcaya, Camarines Sur, Ilocos Norte, Rizal, Bataan, and Camarines Norte registered increases of above 25 per cent over their production in 1924, while Batanes, Occidental Negros and Antique had decreases of over 10 per cent of their last season's crop.

The rice producing provinces like Nueva Ecija, Pangasinan, Tarlac, Pampanga, and Bulacan also registered increases, their combined production during 1925 being 19,506,000 cavans of rough rice, against 17,573200 cavans in 1924, or an increase of 11 per cent.

SUGAR CANE

With a total area slightly less than that planted in 1921, the largest on record, the sugar crop of these Islands recorded this year the substantial increase of 32 per cent over the largest crop ever gathered before—that of 1921 also.

The area planted for 1925 was 239,470 hectares and gave 10,659,480 piculs of sugar, 521,030 piculs of panocha, 4,833,860 liters of molasses and 4,315,210 liters of basi, all together valued at ₱112,729,900. Compared with the yield for 1924 when the area planted was 227,190 hectares and the production was 7,132,640 piculs of sugar, 456,100 piculs of panocha, 2,976,550 liters of molasses and 3,880,570 liters of basi, valued altogether at ₱105,667,180. This shows a remarkable increase in a single year of 49 per cent in the production of sugar, 14 per cent in the production of panochas, 62 per cent in the production of molasses and 11 per cent in the production of basi.

This increase was however registered mostly in the provinces where sugar centrals are established, for said provinces produced in 1925, 54 per cent more than in 1924, while in the remaining provinces the increase was only 14 per cent.

There was also a notable increase in the average yield of sugar per hectare in the Philippine Islands in 1925 as compared with that for 1924. These averages were 47 and 33 piculs, respectively, or 42 per cent more. Here again it was only in the places in and around the sugar centrals, where the farmers averaged 58 piculs per hectare in 1925 against 38 piculs in 1924, that there was progress. In other places the average yield remained unchanged—around 21 piculs per hectare.

In spite of these increases there was only a slight advance in the total value of this crop, because of a considerable fall in prices. During the year 1925, the average prices were ₱11 per picul of centrifugal sugar; ₱7.35 per picul of mascabado; ₱8.39 per picul of panochas; ₱.09 per liter of molasses and ₱.15 per liter of basi. The prices were ₱15.93 for centrifugal; ₱10.69 for mascabado; ₱9.50 for panochas; ₱.13 for molasses and ₱.17 for basi, in 1924.

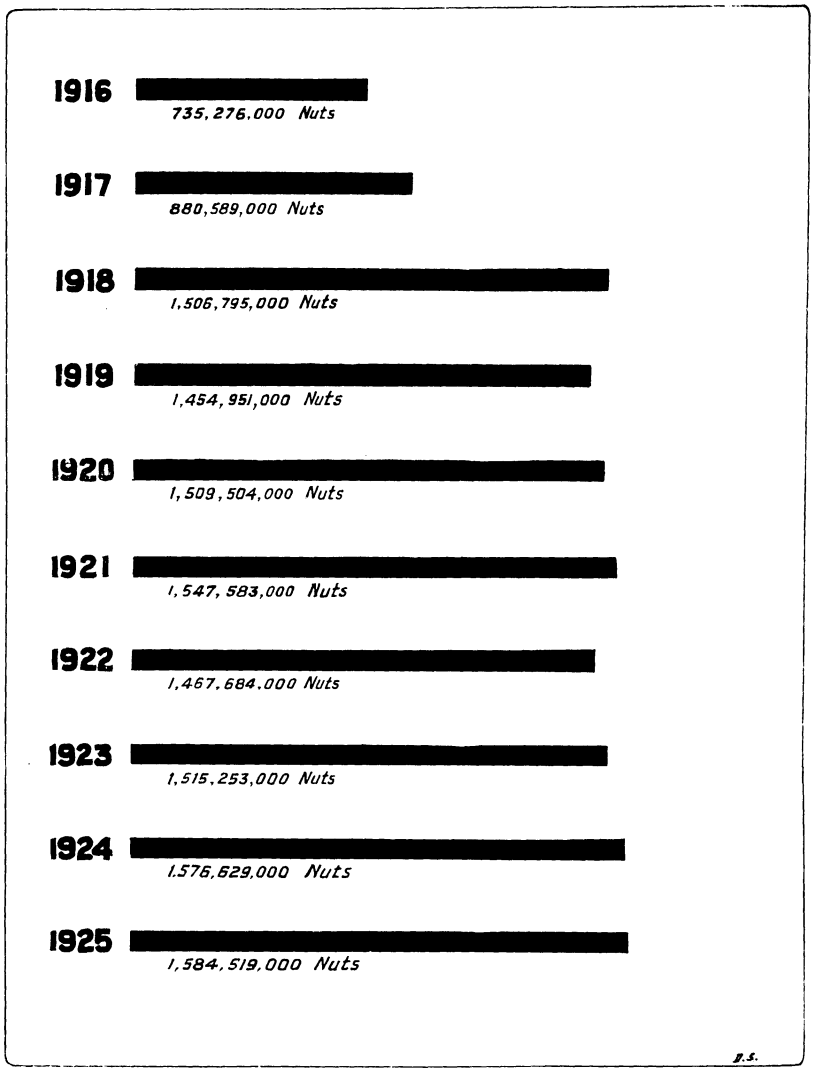
COCONUTS

During the year there were over 2,000,000 trees newly planted and the number of trees in bearing increased by 2,000,000 over those in 1924, whereby the production increased by .5 per cent but the yield of copra and tuba decreased by 6 and 24 per cent, respectively.

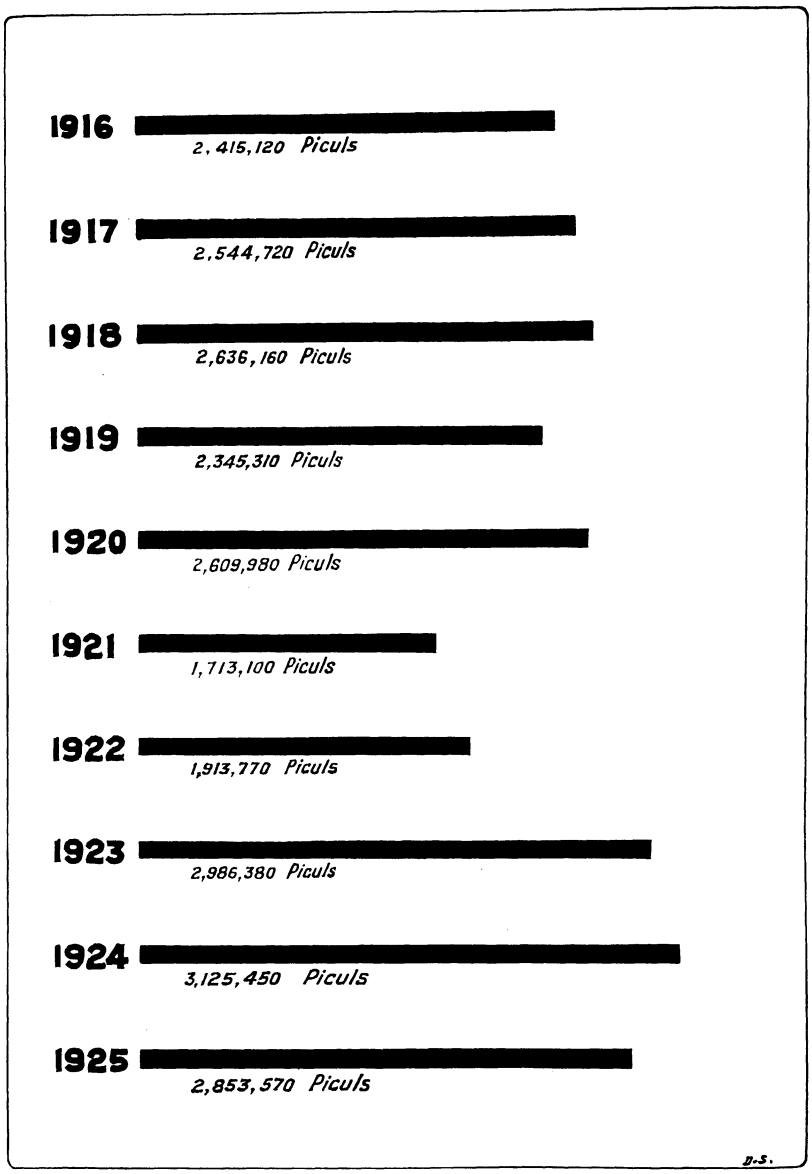
This is the result of the loss sustained by the plantation last year on account of unfavorable weather and of pests and diseases, it being estimated that the former damaged 16 per cent of the total trees planted the latter 2 per cent.

The total number of trees for 1925 was 89,637,770 of which about 53,165,880 were in bearing, and about 449,200 were used for the production of tuba, while the remainder were young trees. The corresponding figures for 1924 were 87,460,000, 51,154,600 and 540,460.

The total production was 1,584,519,000 nuts, of which about 110,678,000 were sold fresh for the table or were desiccated for exportation and the remainder turned into copra and coconut oil, yielding 5,726,800 piculs and 1,993,450 liters, respectively. With the exception of coconut oil, of which there was 7 per cent more than for 1924, the remaining products suffered reductions, especially tuba. The figures of production for 1924 were 1,576,629,000 nuts, which yielded 6,119,150 piculs of copra and 1,865,770 liters of oil and the remainder, or 45,588,000 nuts were sold fresh. The production of tuba was 87,252,230 liters in 1925 against 114,581,800 liters in 1924.



Graph showing production of COCONUTS from 1916 to 1925



Graph showing production of HEMP (ABACA) in piculs from 1916 to 1925

Coconut growers found, however, some compensation for their losses in production in the higher prices paid to them for their product. The prices for 1925 and 1924 were for copra, ₱10.47 and ₱9.39 per picul; for coconut oil, ₱.43 and ₱.41 per liter; for tuba ₱.08 and ₱.07 per liter and for nuts, ₱3.46 and ₱3.57 per hundred. The total value of coconut products was ₱71,847,980 in 1925, against ₱68,134,370 in 1924, or 5 per cent increase.

ABACA

This crop also registered a reduction both in the total area planted and in the production of fiber because of the extraordinary floods and typhoons during the preceding year. Not less than 25 per cent of the area planted then was damaged, and that caused a reduction of 8 per cent in the yield for 1925.

The area planted in 1925 was 477,110 hectares against 485,340 hectares in 1924. The corresponding yields were 2,853,570 and 3,125,450 piculs. There was, however, the big jump in prices of from 13.82 per picul in 1924 to ₱22.53 per picul in 1925, the planters thus receiving over ₱21,000,000 for a smaller crop this year than for a larger one the year before. The total value for 1925 was ₱64,296,240.

Leyte, Albay, and Samar, the provinces that lead in the production of abaca, suffered the greatest reductions, their combined yield in 1924 having been 1,671,370 piculs while this year they had only 1,259,280 or a loss of nearly 25 per cent.

CORN

Corn growers were particularly unfortunate this year, for they were not only unable to replant the areas destroyed and so had a smaller crop because of too much water at first and then too much drought, but they also got prices lower than those paid the year before.

The total area planted to corn during 1925 was 522,380 hectares and the yield was 7,606,110 cavans, which brought the farmers ₱30,767,250 at the rate of ₱4.04 per cavan. Compared with the results obtained in 1924, when the 533,230 hectares under cultivation gave 7,830,320 cavans worth ₱33,303,960, at ₱4.25 per cavan, the losses were 2 per cent in the area planted, 3 per cent in the volume of the crop, 8 per cent in the total value and 7 per cent in the price per cavan.

Bulacan, Zamboanga, Nueva Vizcaya, Pampanga, Laguna, Batanes, Masbate, Occidental Negros, and Palawan suffered

reductions ranging from 25 to 46 per cent as compared with the previous year's crop.

TOBACCO

Practically the same area was planted to tobacco as in 1924, but the yield was 3 per cent smaller in 1925 because of unfavorable weather, being but 910,910 quintals of tobacco leaf as against 941,800 quintals the preceding year.

There was a rise of 83 centavos in the price per quintal, that is, from ₱12.22 the year before to ₱13.05 this year and this made the value of both crops almost equal, for it was ₱11,505,420 in 1924 and ₱11,891,590 in 1925.

Among the leading producing provinces, Cagayan, Cebu, and Isabela had the greatest decrease, their combined production having been only 459,010 quintals this year as against 510,970 the year preceding, or 10 per cent less. Ilocos Norte and Pangasinan, on the other hand, enlarged the combined area of their tobacco plantations by 14 per cent and their yield advanced 8 per cent. Together, they harvested this year 174,610 quintals and in 1924, 161,670.

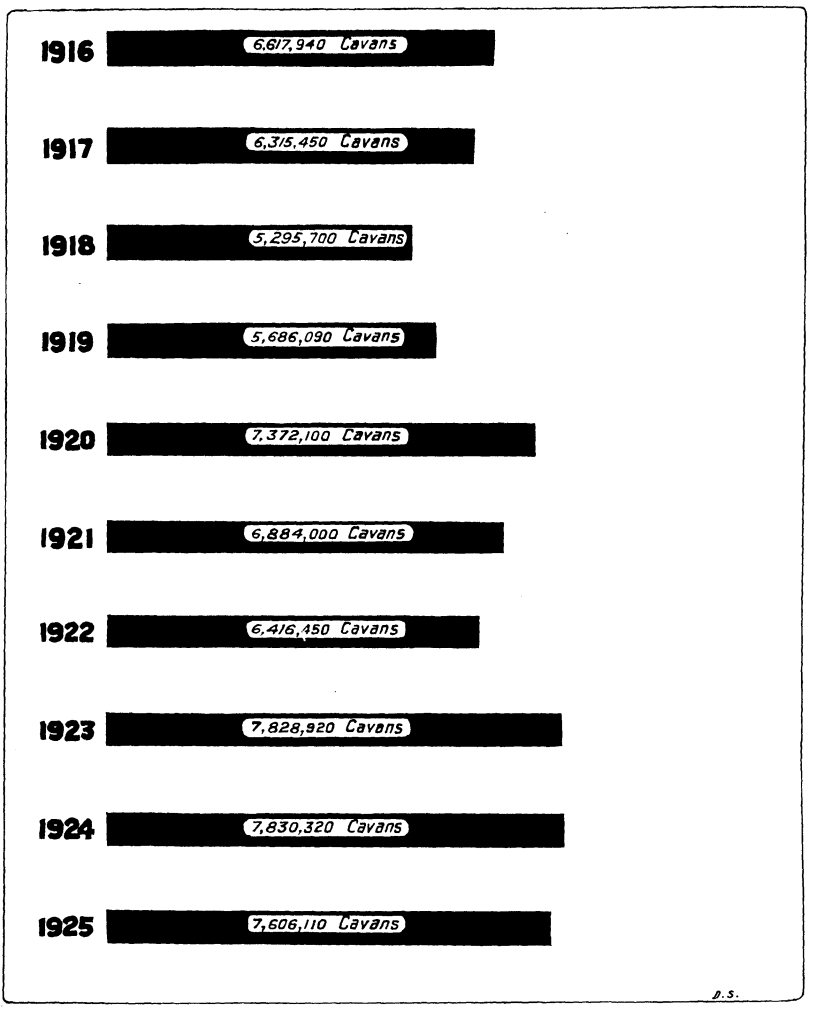
MAGUEY

The cultivation of this fiber is of late again attracting the interest of farmers, judging by the steady increase that the area planted thereto is registering every year. It is, however, confined to a few provinces, and these are principally the provinces where abaca is not cultivated.

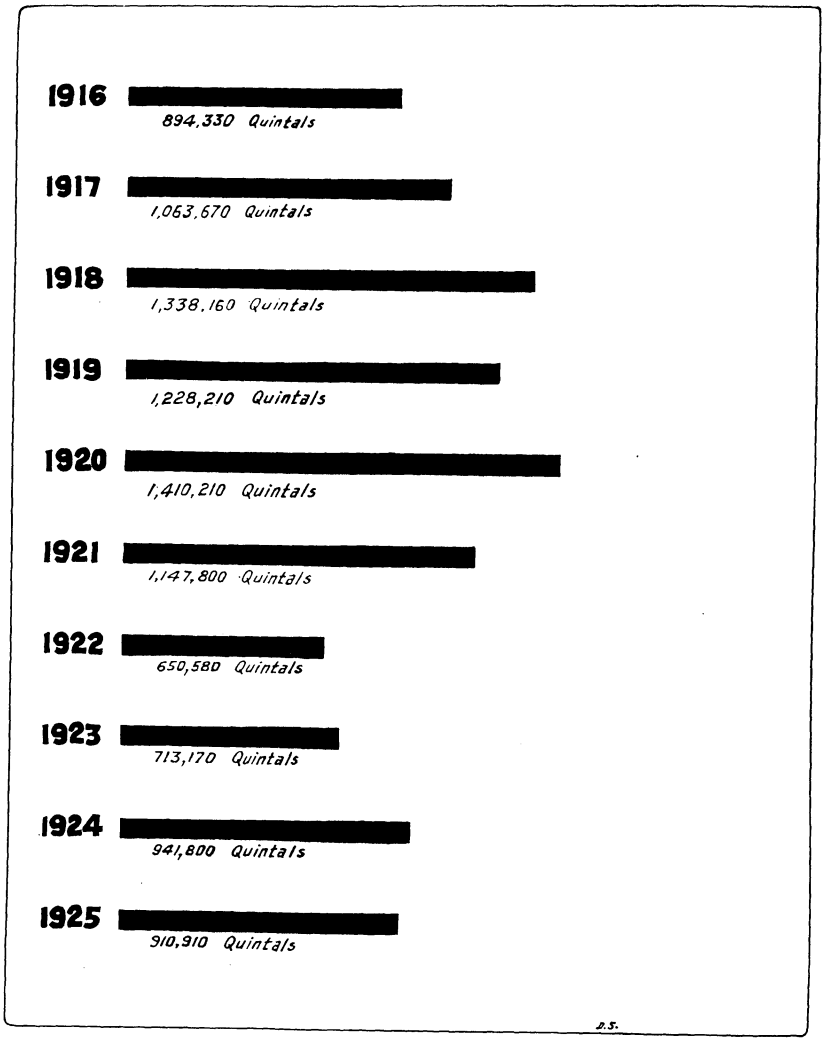
The area planted in 1925 was 31,100 hectares, or 6 per cent larger than that for 1924, and yielded 456,000 piculs of fiber. This yield was 3 per cent larger than that for 1924, which was 443,010 piculs; and the average price per picul rose so high that the total value of the crop jumped from ₱3,649,140 in 1924 to ₱5,682,530 in 1925, an increase of 56 per cent.

CACAO AND COFFEE

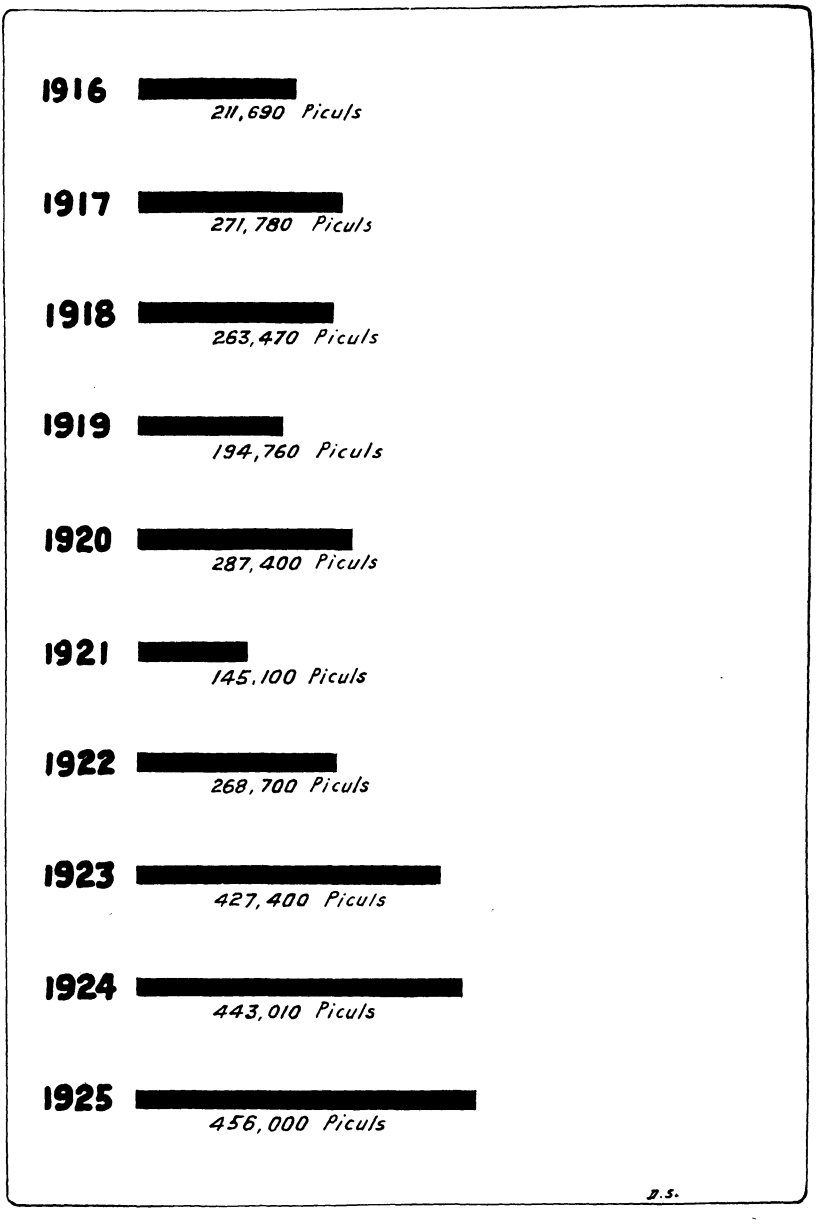
These two crops showed increases this year in the number of trees planted as well as in the respective production as compared with 1924. On June 30, 1925, there were 2,000,350 cacao trees, and 2,335,600 coffee trees and during said year the production was 1,111,900 and 1,178,200 kilos, respectively. During the year 1924, the production of cacao was 1,160,800 kilos and that of coffee 1,173,600 kilos with 1,969,400 and 2,259,400 trees respectively under cultivation.



Graph showing production of CORN in cavans from 1916 to 1925



Graph showing production of TOBACCO in quintals from 1916 to 1925



Graph showing production of MAGUEY in piculs from 1916 to 1925

The prices for these products are slightly but steadily rising every year due to the increasing consumption and the insufficient local supply. The prices paid during 1924 and 1925 were ₱1.04 and ₱1.07 per kilo for cacao and ₱.69 and ₱.71 per kilo for coffee, respectively. The values were ₱1,189,100 in 1925 against ₱1,206,600 in 1924 for cacao; and ₱836,300 in 1925 against ₱806,900 in 1924 for coffee.

LIVESTOCK

On account of the impossibility of completing the compilation of the data for the year 1925 in the short period elapsing between the end of the year and the date fixed for presenting this report, the figures for animals given here are one year behind, that is, they are for December 31, 1924.

There was a general increase in the number of all animals during the year 1924, notwithstanding the fact that the rate of birth of some kinds of animals registered decreased on account of the prevalence of diseases during the two preceding years.

The birth rate for carabaos fell 1 per cent, that for cattle, 3 per cent, horses and mules, .3 per cent, and hogs, 24.4 per cent; but for goats it increased 1.4 and for sheep .2 per cent.

As to diseases, there has been an improvement except as regards horses and goats. The rate of mortality for these animals increased by .5 and .1 per cent, but for carabaos, cattle, hogs, and goats, it decreased .4, .8, .4, and .3 per cent, respectively.

The meat consumption increased by fractions of one per cent for carabaos and sheep, remained the same for cattle and horses and decreased for hogs 4 per cent and for goats, .2.

EXPERIMENTS, INVESTIGATIONS, ETC.

Variety and planting distance tests on corn and variety and cutting tests on forage crops were continued at Lamao (the latter at La Carlota also); and dry-season planting, the variety, fertilizer tests, submergence-depth experiment in rice irrigation and submergence of rice weeds experiments were repeated this year with lowland rice varieties; and the variety and head-to-the-row tests were also repeated with upland rice. A seedling experiment and the seasonal planting test on upland rice were also made.

At Alabang, Sipot (lowland); at Rosales, Madaling-Araw, Apostol, a non-bearded variety; at Lamao, Madaling-Araw, pedigreed Kinastila and Kinampupoy produced the heaviest yields this year.

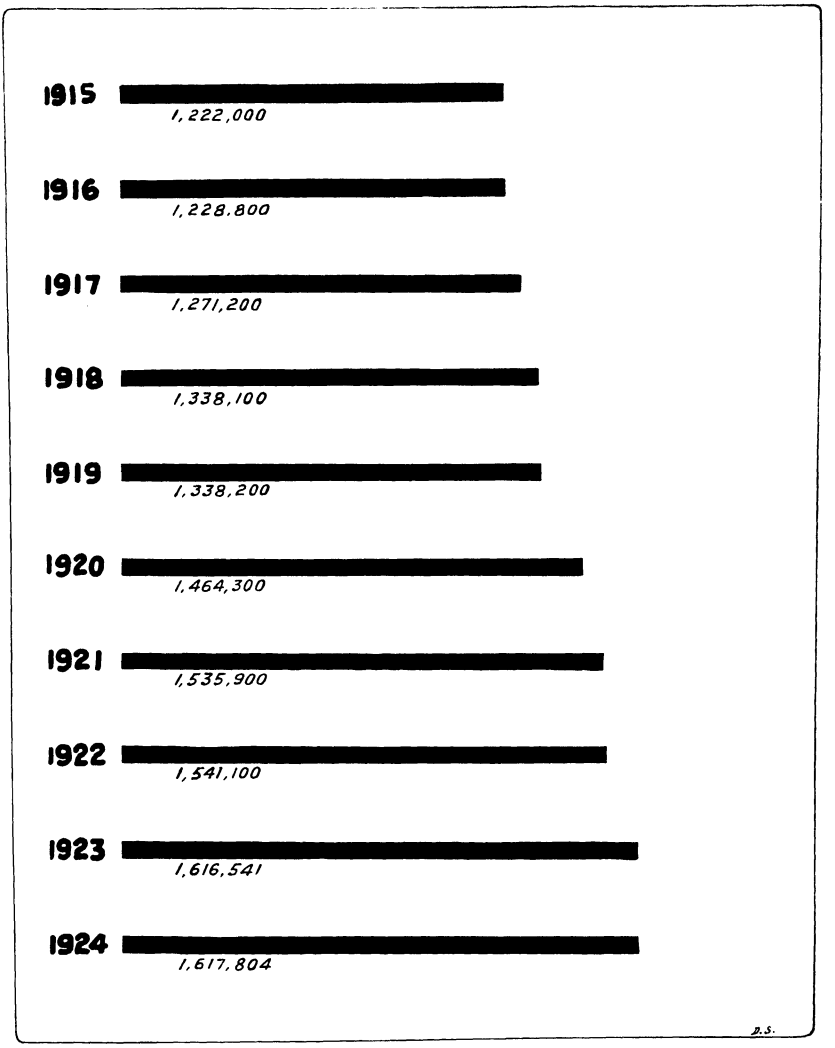
Sugar cane.—In the acclimatization test at La Carlota only 33 out of 105 varieties and strains were found desirable. In the variety test (repeated), the New Guinea 24–A produced 152.53 piculs of sugar per hectare; New Guinea 24–B, 133.99; Badila, 121.42; Hawaii–109, 119.04; and Negros Purple, only 94.03 piculs. Negros Purple mulched with a commercial paper gave an increase of 63.2 per cent. Other tests and experiments were repeated.

Tobacco.—In the seeding testing (repeated) at the Ilagan Tobacco Experiment Station, Ilagan, Isabela, there was found to be a difference of almost 200 per cent germination between light and heavy seeds in favor of the latter. The bigger native varieties showed a $33\frac{1}{3}$ per cent higher germination than the smaller exotic varieties. The 10–Repollo, 11–Espada, 12–Pampano No. 1, 6–Pampano No. 2, 18–Florida Sumatra, 15–Romero, 47–Baker's Sumatra, 36–Bahia, 65–Havana, and 40–S. No. 2 were used.

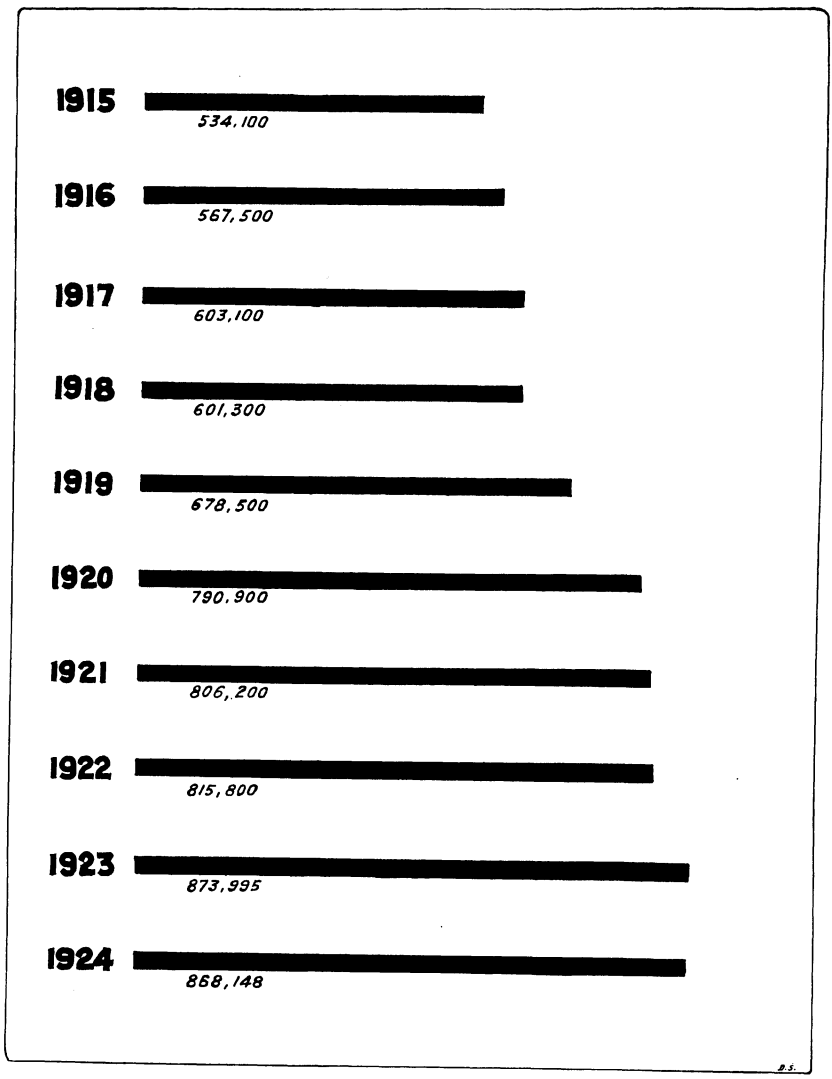
In the standardization of varieties and strains, the original stock of 11 varieties and strains at Ilagan has been reduced for convenience' sake to 8: 12–Pampano No. 1, 17–Pampano No. 3, 6–Pampano No. 2, 51–Pampano No. 4, 11–Espada, 10–Repollo, 52–Vizcaya and 15–Romero. Notwithstanding adverse weather conditions, the characters statistically studied have showed fair means, standard deviation and coefficient of variability. Only the heights of the plants varied. The 12–Pampano No. 1 and 6–Pampano No. 2 gave the broadest leaves and the best yield, the 11–Espada the narrowest leaves and 10–Repollo, medium leaves; the 52–Vizcaya and 15–Romero produced aromatic leaves; and the 17–Pampano No. 3 and 51–Pampano No. 4 were not heavy yielders—but had the finer veins of the native varieties.

In the wrapper variety test (repeated) all varieties came out true to type. It is believed that light glossy leaves can be obtained by priming a little before the ordinary maturity stage of the leaves. Other experiments were repeated and new ones started. 1,087 pedigree selections were made representing 14 varieties and strains.

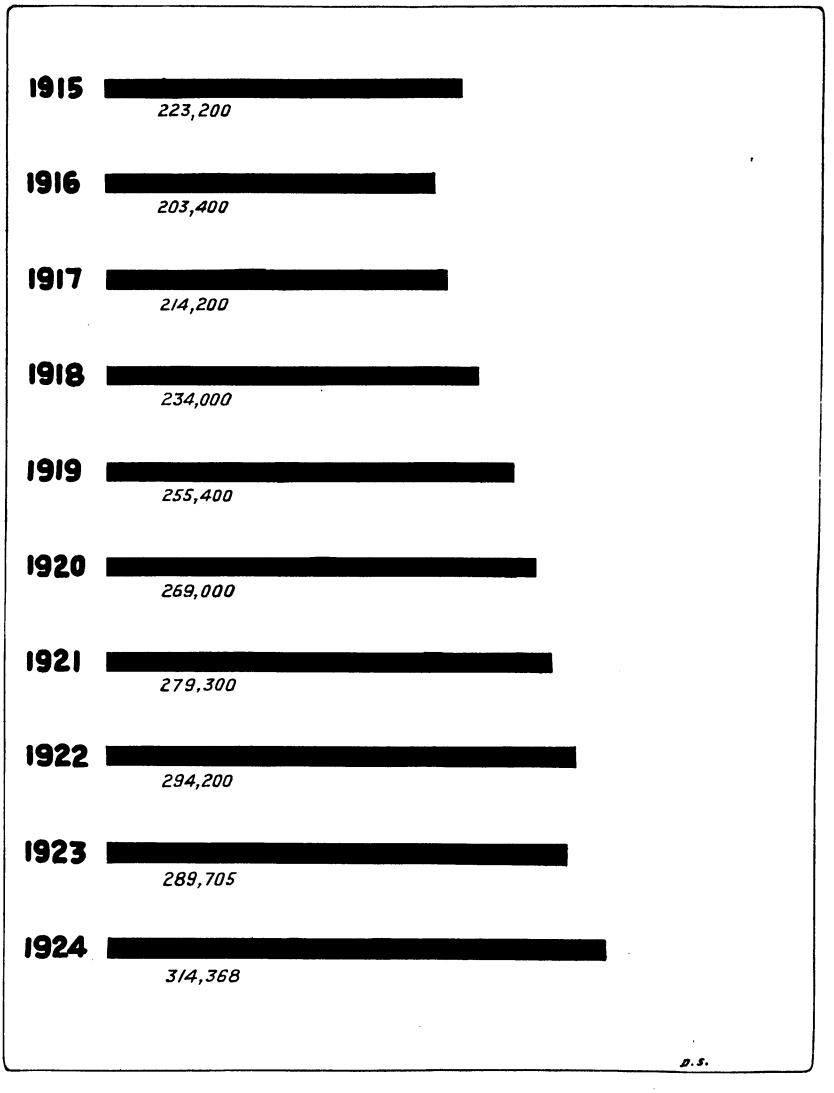
Abaca.—In the variety test (continued) at the Guinobatan Abaca Experiment Station, the Tangongon increased to 97 per cent in height in one year and the Lausigon, Maguindanao over 200 per cent. The Lausigon led with 11.1 as the average num-



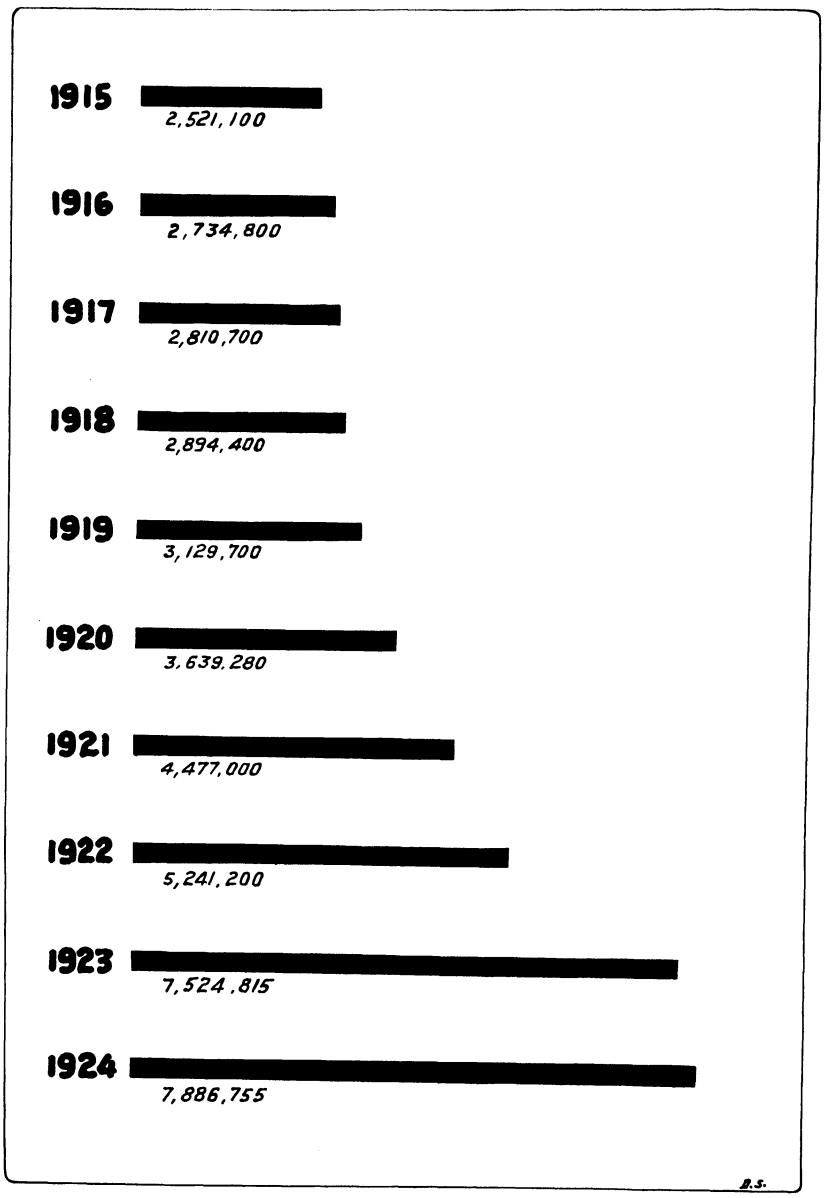
Graph showing number of CARABAOS from 1915 to 1924



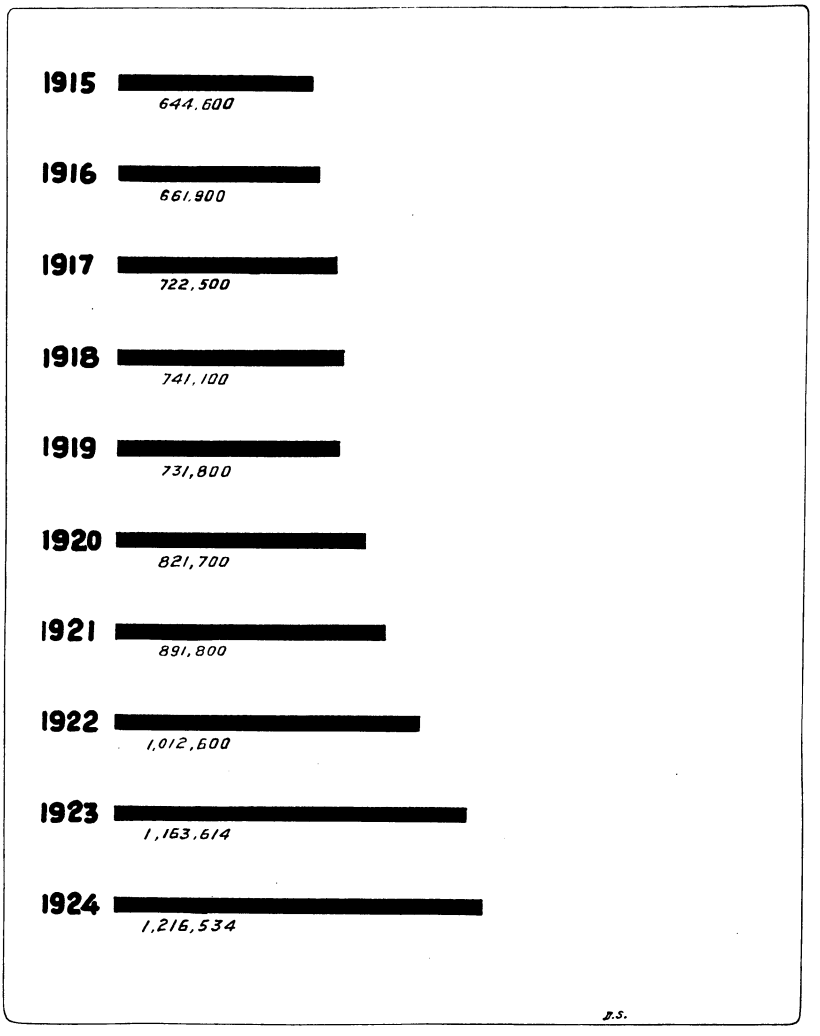
Graph showing number of CATTLE from 1915 to 1924



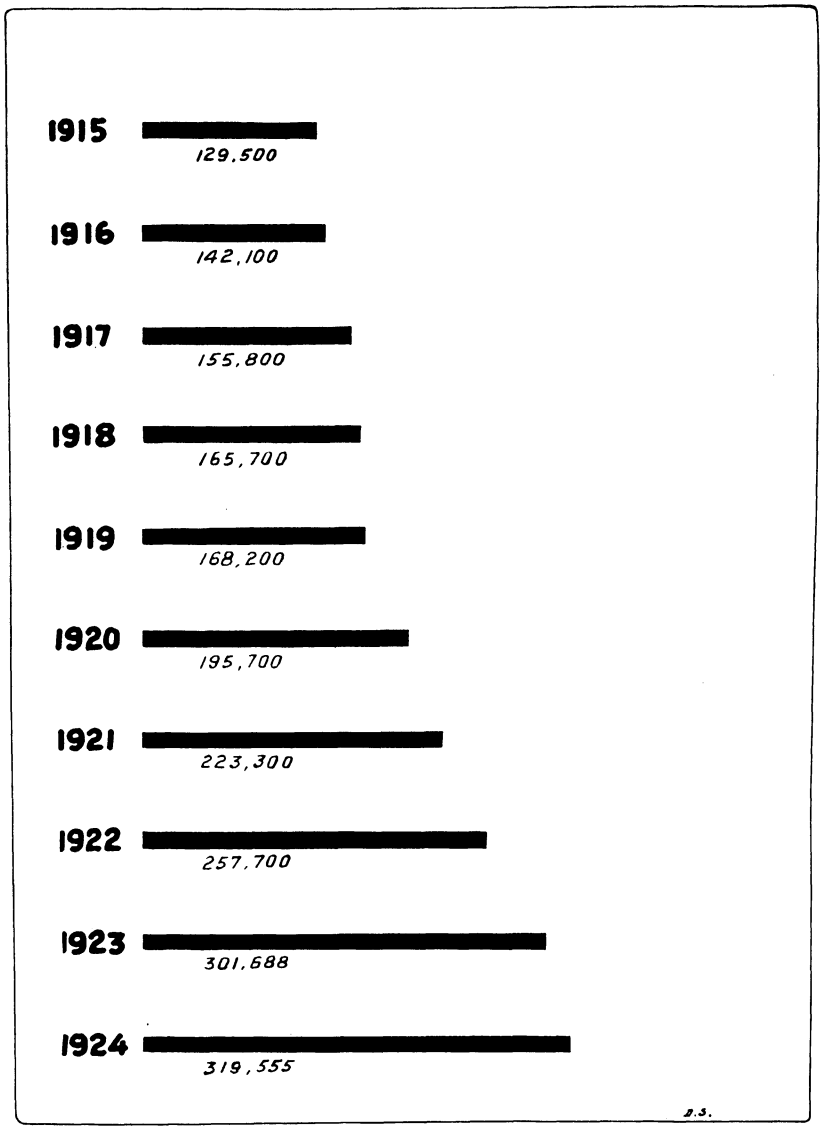
Graph showing number of HORSES from 1915 to 1924



Graph showing number of HOGS from 1915 to 1924



Graph showing number of GOATS from 1915 to 1924



Graph showing number of SHEEP from 1915 to 1924

ber of stalks per hill. In the yield test per hectare a preliminary investigation showed that the present average plantation containing several varieties of abaca in Albay gave a total yield of 27.3 kilos of J2 fiber per hectare per year.

Agaves.—In the retting test of maguey (repeated) at Lamao Experiment Station at Lamao, Bataan, 229 leaves of maguey weighing 72 kilos gave 1.16 kilos of air-dried fiber or 1.6 per cent with an average length of 1 meter. It took 4 days to rot these in salt water, 7 days in salt water and fresh water (alternating) and 11 days in the mud.

Cotton.—The cotton tests were repeated at Lamao and Trice was found the best variety. It was noted that this variety needed different planting test distances.

Kapok.—The two-year old trees fruited for the first time with 34 pods, the highest number of pods per tree under Lamao conditions.

Other fiber plants.—The newly introduced fiber plants, consisting of Balsa, *Ochrona lagepus;* Pochote, *Ceiba sosculifolia;* Pita floja, *Ananas macrodentes;* and Javanese kapok, *Ceiba pentandra,* are doing well under Lamao climatic conditions.

Other agronomic crops.—In the variety tests (repeated) Spanish peanuts, the new Era cowpeas, La Union red adlay and the Basso sorghum were the highest yielders.

Citrus.—At Lamao, 3 varieties of limes, one of lemons, 30 of pomelos, 2 of mandarins, 6 of oranges were high yielders; and at Tanauan, Batangas, 10 varieties of oranges, 4 of lemons, 6 of pomelos and grape-fruit and 2 of limes did well.

Cacao and coffee.—Fertilizer, irrigation and comparative variety tests were continued. New experiments were undertaken. Liberian coffee gave the highest yield—1,533.18 kilos of clean coffee per hectare—and Excelsa coffee was second with 1,497.62 kilos in the comparative test. There are 285 young cacao plants of six varieties growing at Lamao.

Mangoes.—A successful method of propagating the mango vegetatively lately tried at the Lamao Experiment Station is side-grafting, which is skin to inarching or bottle-grafting. The lower part of the scion is inserted in a pot of soil and the upper part covered with damp moss.

Pineapples.—Of the 3 mixtures of fertilizers tried the best combination was found to be one containing copra meal, potassium sulphate and bone meal, applied at the rate of 482.55 kilos

per hectare. The plots thus treated gave a yield of 25,962.42 kilos of fruits. In the comparative test of root crops, Hawaii No. 1 was the best of 36 varieties.

Vegetables.—Variety tests were again made with cabbages, peppers; and acclimatization and other tests with avocados, semi-temperate fruit and nut trees and the chayote were conducted.

Among the activities was papaya-papain extraction, and an experiment in emasculating bananas.

The Division had 2,018 coöperators this year experimenting on agronomic, fiber and horticultural plants as against 897 in 1924.

Farm machinery and implement investigations were conducted and blasting done and observations made of the Santa Barbara irrigation project in Iloilo.

Rubber investigation was an important part of the work and investigations were also conducted as to coconuts and abaca in some provinces.

Para rubber.—The results of investigations showed that Mindanao has approximately 305,249 tappable trees in the three provinces of Cotabato, Davao, and Zamboanga, which are all out side the typhoon belt and have an evenly distributed rainfall and a humid climate; Bataan, 700 tappable trees; Sorsogon, about 5,000 trees, of which about 2,000 are of tappable age, and La Carlota Sugar-Cane Experiment Station, La Carlota, Occidental Negros, 18 tappable trees.

Para rubber thrives best in Mindanao in plantations having surface soils varying from deep alluvial to very dark friable clay loam and subsoils of clay to brownish nontenacious clay. It also grows well in Bataan, which although it has distinct dry and wet seasons and is within the typhoon belt has areas protected by forests, and suitable soil conditions.

In Mindanao they prepare forest lands for planting rubber by the "caingin" system. The planting distances found best are: 20 by 24 feet, 20 by 22 feet, and 20 by 20 feet.

Ring-weeding, hoeing and plowing are done in cultivating young trees, but when the trees are 4 or 5 years old cattle are turned in to pasture and tall growing weeds are cut down once a while. Soil aëration is done by trenching 2 feet deep by 2 feet wide alternately, between the rows. Catch and cover crops are grown on one- to four- year old plantations.

Low yields commence when the leaves fall—from February to April; the high yields are from July to January.

Flowering time is May to June; fruiting, August to October beginning at the age of four to five years.

Typhoons, of course, reduce the yields; rain is detrimental at the time of tapping, but increases the flow of latex for the next four days.

The trees are tapped when from four to six years old but it is considered better to wait until the eighth year, because not till then is the bark thick enough to withstand severe injury. Tapping is done two feet above the ground and one foot above the former opening on the other side of the trunk. A half-spiral is the tapping system for young trees and one-third to one-fourth for older trees. A man taps from 300 to 500 trees in 2 to 3 hours work.

The average yield per tree not yet at its optimum yielding capacity is 1.08 kilos of dry rubber; and 2.83 kilos is a fair yield for older trees. The cost of production per kilo including overhead charges is ₱1.22 and ₱752 is said to be the cost of bringing a hectare of rubber into bearing in Mindanao.

Castilloa and Ceara rubber.—There are reported to be about 24,000 tappable Castilloa trees also in Mindanao and 52 tappable trees of Ceara rubber in La Carlota Sugar-Cane Experiment Station, La Carlota, Occidental Negros. Rubber extracted from Castilloa is sold as scrap rubber and is of inferior quality to Para rubber; but Castilloa rubber extraction is simple and although the trees yield only about half as much as Para they are not so exacting as to cultural requirements. Six trees of Ceara rubber in La Carlota in 1925 yielded 59.6 grams which was only about one-third of the yield from six Para rubber trees, these having given 209.18 grams for three days' tapping.

Coconut investigation in Batangas, Bataan, Masbate, Romblon, and Oriental Negros.—In Rosario, Batangas, it has been found that nuts from young trees (under 15 years old) used for seeding gave only 60 per cent germination and that the resulting seedlings were mostly rachitic.

Certain planters in Abucay and Cabcabin, Mariveles, Bataan, despite the well-marked dry season, can produce coconuts profitably, harvesting from 30 to 100 nuts per tree annually and selling the young ones for confectionery purposes at from ₱0.10 to ₱0.15 apiece.

In San Jacinto and San Fernando, Masbate, the large coconut estates use tractors with disk plows and harrows to eradicate cogon and the like from their plantations, spending from ₱15

to ₱20 per hectare. At Uson, Masbate, certain homesteaders control rank weeds by plowing and harrowing the interspaces in the coconut groves six times a year at regular intervals and planting same thickly with plants that grow rapidly such as camotes.

Some coconut owners in Romblon and Iloilo find it profitable to lease their trees for "tuba" tapping at the rate of ₱0.01 per day per tree throughout the year.

During the dry season, tractors are utilized in cultivating coconut trees on the Polo Coconut Plantation, Tanjay, Oriental Negros. The average cost is ₱12.70 per hectare.

Abaca investigations in Surigao, Samar and Leyte.—In the northern part of Surigao and the central part of Samar where the soil is a heavy clay, abaca plants have been found to be of much smaller varieties—like the Babauno in Surigao and the Lawisid in Samar—than those of Leyte where the soil is clay loam and sandy loam.

In Leyte, there are found the following varieties: the Inusa, productive; Layahon (Liahon), having a fine white fiber; Banguisan, deep-rooted; Alman, with long and strong fiber excellent for rope making; Samoro, a fine fiber for cloth weaving, Ihalas (wild) with brittle fiber.

Alman and Pinoconan have the longest fibers—from 3.45 to 3.80 meters. Alman and Liahon are easy to strip; Agutay shows more of the banana than abaca characteristics.

The longest stalk found was of the Agutay variety. It measured about 4 meters and the heaviest production, 63.25 kilos of fiber per stalk, was produced from the Alman variety.

Canton and pacol were not found in Leyte, Surigao and Samar.

No abaca disease or pest was found in the places investigated. Typhoons have always been the greatest enemy of abaca in these provinces.

All the plantations are old and neither cultivation nor rejuvenation was evident, though many of them had a good stand.

No modern stripping machines are used in these three provinces. The stripping knives used have teeth ranging from 18 to 22 and the grades of the fiber produced range from "J" down to "DM."

Seed and plant introduction.—Seeds and plant materials acquired by the division during 1925 for propagation purposes:

Totals: Species, 178; varieties, 515; seeds: 21 packages, 48,332 seeds, 3,274 ears; budsticks and cuttings, 17,389; plants, 8,899.

AGRICULTURAL EXTENSION WORK

Three more provinces have been covered by the field force of the Agricultural Extension Division this year, viz., Leyte, with two agents and Zambales and Ilocos Norte, with one each. Other provinces asked for the services of agents also but the division had no agents to detail therein.

The division supplied seeds and plant materials to 5,911 persons or 681 more than in 1924.

Horticulture campaign.—Over 200,000 fruit trees were planted in the districts where there were agents of this division, many being budded, grafted or marcotted.

It was discovered in the Cebu provincial nursery that banana petioles made a cheap and satisfactory substitute for the sphagnum moss and other materials used in grafting.

Field demonstration.—The agents helped the farmers bud, graft and prune a total of about 10,000 trees.

Coffee	102,813	Lanzon	4,823
Mango (s)	6,935	Avocado	336
Mango (g)	411	Nangca	2,546
Citrus (s)	8,730	Coconut	31,121
Citrus (b)	517	Anonaceous	332
Cacao	8,570	Bananas	13,678
Chico (m)	159	Papaya	3,572
Rimas	1,001	Pineapple	9,311
Kapok	8,015	Miscellaneous fruit trees	3,002

NOTE.—(s) seedlings, (b) budded, (g) grafted, and (m) marcotted.

Private nurseries.—Farmers were encouraged to start their own private nurseries, these being directly supervised by the extension agents. The approximate number of fruit trees therein is at present 110,000.

Seed and plant distribution.—The value of the seeds distributed during the year from the Central Office and stations and nurseries under supervision was ₱7,128.81, of which ₱1,513.19 were given free of charge. ₱13,700.78 worth of plant materials were distributed, ₱3,884.46 worth of which were given free.

Singalong Seed Testing and Plant Propagation Station.—This station produced 6,757 grafted mangoes, of which 2,552 have already been distributed. The station spent ₱11,530.25 and produced ₱27,576.33 worth of seed and plant materials, making a net income of ₱11,530.25. It handled 398 shipments of seed and plant materials.

Lipa Demonstration Station.—This station produced 91,000 seedlings, of which 59,000 were coffee and over 42,000 of these

were distributed, while it spent ₱3,636.02 and produced ₱10,567.34 worth of seed and plant materials, making a net income of ₱6,931.32.

La Paz (Iloilo) Demonstration Station.—The poultry and swine project in the station has been discontinued since June. The station spent ₱2,491.22 and produced ₱4,500.17 worth of seed and plant materials, making a net income of ₱2,008.95.

Nurseries.—There are 10 provincial and 14 municipal nurseries under the supervision of this division. Two of the provincial nurseries are in Cebu and one each in the Provinces of Leyte, Bohol, Laguna, Bulacan, Nueva Ecija, Pampanga, Pangasinan and La Union.

Fruit trees are propagated in these nurseries but some field crops such as corn, sugar cane, vegetables, forage crops, etc., are produced for distribution purposes. In Santa Barbara, Pangasinan, rice and tobacco are also grown and graded swine and chickens raised to improve the animal breeds in that region.

Sugar-cane project.—During the year 147 coöperators on sugar cane were furnished with cane cuttings. Badila and Hawaiian–109 are in great and increasing demand.

Producers' coöperative associations.—Due to the many difficulties met with both in the campaign and in helping the associations function, only six of the 24 coöperative producers' associations that existed at the beginning of the year remained active during the year, but two were added. Associations raising tobacco, poultry including ducks, and mangoes are the most successful.

The Nemmatan Tobacco Coöperative Producers' Association in Jones, Isabela, is the most successful association ever organized in the Cagayan Valley by the Bureau. It handles the tobacco crop of the members and got them ₱3.50 per fardo this year, the highest price obtainable in the Valley, to their great satisfaction.

The association was also able to harvest 100 oyones of palay from the forest leased area in Nemmatan, Jones, which was leased from the Bureau of Forestry last year, and planted 4,125 different varieties of fruit trees valued at ₱521.52.

Vegetable project.—Eighteen thousand three hundred and one home gardens and 252 commercial gardens were supervised.

Milk.—Only one agent worked on this project this year and only in the Provinces of Laguna and Pampanga. The work was purely educational—making actual demonstrations and giv-

ing lectures to individual farmers or in groups. Four hundred and nine caraballa owners were advised as to the proper feeds and feeding, care and management of their animals to obtain more milk.

There were 367 kilos of cheese valued at ₱532.50 produced as a result of the actual demonstration made under the improved methods.

The organization of the milk producers, however, was temporarily suspended this year on account of the outbreaks of rinderpest and anthrax occurring in some provinces from time to time.

Poultry project.—Over 44 commercial poultry raisers with a total of 5,578 fowls, besides 8,678 individual poultry raisers having a total of 45,463 fowls were advised and 3,339 capons produced.

Tobacco project.—The work was mainly along educational and extension lines, special attention being given to proper cultural methods, curing and fermentation and the classification and marketing of the leaf through the organization of the growers. Actual demonstrations were made, lectures were given, conferences were held with the individual farmers and circulars distributed. Twenty gantas, 78 packets and 820 grams of improved tobacco seeds were distributed to 204 tobacco planters for trial planting during the year. These varieties consisted of Sumatra, Anipa-Sumatra, Florida-Sumatra, Anipa-Broad Leaf, Baker's Sumatra, Medium-Repollo and the Pampano varieties. Florida Sumatra and Sumatra showed excellent results in Cagayan and Baker's Sumatra in Isabela, both as to quality and production.

After the floods in the Cagayan Valley there were distributed 164,600 tobacco seedlings to replace those destroyed in the seedbeds.

Planters were also told how to construct curing sheds according to the revised regulations as amended, and helped to plant supplementary crops such as corn, rice, root crops and fruit trees so that they would not be forced to sell their tobacco crop at a low price in time of need.

There were 6 tobacco inspectors and one agricultural extension agent in Isabela and Cagayan.

Rubber distribution.—The rubber agitation which began along about July of this year resulted in some 300 written requests for information and planting materials, but seeds only became

available in September. They were secured from Basilan, Zamboanga and Sorsogon, and were from Para rubber trees.

Before the passage of the Rubber Bill, Act No. 3230, November 14, 1925, there had already been distributed 61,695 Para rubber seeds valued at ₱587.56 and 1,000 seedlings worth ₱60. During the year there was a total distribution of 108,850 Para rubber seeds valued at ₱1,222.17. Two thousand seedlings were purchased from Sorsogon for immediate distribution. Many inquiries in the Central Office and in the field were attended to. About 500 copies of circulars in English and in Spanish on rubber were distributed through this division during the year.

PLANT PESTS AND DISEASES

Under Act No. 3217, ₱100,000 more was provided for locust scouting work.

Adminstrative Orders No. 51 and 52 were promulgated. No. 51 put an interprovincial quarantine on all plants of the species of the genus *Musa*, in order to prevent the spread of the two dangerous plant diseases known as "heart-rot" and "root-rot" (bunchy-top), and revoked Bureau of Agriculture Orders No. 26 and 45; and Administrative Order No. 52 contains regulations governing the removal of sawdust, bagasse, and other vegetable matter or rubbish, from and near coconut groves; and declares the black bettle (*Oryctes rhinoceros*) to be a dangerous plant pest.

Thirty-three thousand five hundred pesos was allotted from the contributions and gratuities funds to the provinces to assist in campaigns against agricultural pests and diseases.

TABLE 1.—*Showing distribution of contribution and gratuities funds.*

Provinces	Purpose		
	Locust extermination work	Coconut pests and diseases eradication	Abaca pests and diseases eradication
Batangas	.....	₱500.00	₱500.00
Camarines Norte	.....	500.00	500.00
Camarines Sur	.....	500.00	500.00
Cavite	.....	3,000.00	1,000.00
Cebu	₱5,000.00	.....	.....
Davao	.....	1,000.00	1,000.00
Laguna	.....	5,000.00	2,000.00
Leyte	.....	.....	500.00
Mindoro	.....	500.00	.....
Misamis	1,500.00	500.00	.....
Oriental Negros	2,000.00	.....	.....
Pangasinan	.....	1,000.00	.....
Samar	.....	.....	500.00
Sulu	500.00	.....	.....
Tayabas	800.00	3,000.00	500.00
Zamboanga	500.00	1,000.00	500.00
Total	10,300.00	16,500.00	7,500.00

TABLE 2.—*Balances of locust funds (Act No. 2472) in the province at end of year*

Province	Balance	Month reported
Abra	₱892.00	November.
Agusan	493.52	September.
Albay	999.17	October.
Antique	1,118.49	Do.
Bataan	645.23	June.
Batanes	1,040.72	October.
Bohol	1,190.59	November.
Batangas	2,025.50	October.
Bulacan	716.52	June.
Bukidnon	885.78	October.
Cagayan	1,920.66	September.
Camarines Norte	300.00	November.
Camarines Sur	300.00	Do.
Capiz	4,124.34	May.
Cavite	566.57	September.
Cebu	3,867.13	October.
Cotabato	2,476.96	November.
Davao	515.19	June.
Ilocos Norte	765.58	October.
Ilocos Sur	471.00	November.
Iloilo	28.00	June.
Isabela	597.09	September.
Laguna	1,149.68	October.
Lanao	817.68	Do.
La Union	300.00	December.
Leyte	4,264.26	October.
Marinduque	989.62	November.
Masbate	418.97	Do.
Mindoro	2,152.65	April.
Misamis	2,000.00	October.
Mountain Province	1,031.33	Do.
Nueva Ecija	2,999.33	November.
Nueva Vizcaya	1,781.36	Do.
Occidental Negros	450.07	October.
Oriental Negros	778.41	March.
Palawan	134.75	October.
Pampanga	6,287.24	November.
Pangasinan	1,000.00	October.
Rizal	300.00	Do.
Romblon	200.00	November.
Samar	1,853.15	October.
Sorsogon	250.70	Do.
Sulu	.....	.....
Surigao	963.02	November.
Tarlac	300.00	October.
Tayabas	723.39	November.
Zambales	500.00	October.
Zamboanga	500.00	September.

TABLE 3.—*Distribution of locust scouting funds to December 31, 1925*

Province	Amount advanced
Bohol	₱6,000.00
Cagayan	5,000.00
Cotabato	3,000.00
Bukidnon	3,000.00
Misamis	1,000.00
Mindoro	3,000.00
Mountain Province	3,500.00
Isabela	6,000.00
Nueva Ecija	6,000.00
Tayabas	5,500.00
Zamboanga	1,000.00
Total	43,000.00

The locust infestation during 1925 was less serious than usual. At the beginning of the year there being but 45 towns infested, as compared with 50 in 1924. The lowest point of infestation was reached late in February, when only 18 towns were reported infested as against 34 for the preceding year. At the height of infestation (during July, August, and September) all available forces of the Bureau were employed, and the Honorable, the Secretary of Agriculture and Natural Resources solicited the coöperation of all the provincial and municipal officials, through the Chief of the Executive Bureau. The maximum number of towns infested was 121, while in 1924 it was 208.

The three most seriously infested provinces were:

1. Tabuk and the provincial district of Kalinga, Mountain Province, lying in a great grassy valley that is an ideal breeding place for locusts. The swarms in Cagayan and Isabela probably came from there.

2. The region on either side of the mountains in the Bondoc Peninsula in Tayabas, which is grassy and but sparsely settled.

3. The Province of Bohol, which is continuously infested because of the central plateau, where there are dense cogonales whence locusts swarm over not only the rest of the island but also over the surrounding Provinces of Leyte, Cebu, Oriental Negros, and Misamis.

TABLE 4.—*Showing locust infestations during the year 1925*

Province	Number of municipalities			Chronological status, 1925
	Infested	Freed	Still infested	
1. Batangas	1	1	0	July 20 to July 27.
2. Bohol	36	23	13	January 6 to December 31.
3. Camarines Norte	8	8	0	August 28 to November 28.
4. Camarines Sur	1	1	0	October 1 to December 4.
5. Cagayan	23	15	8	January 3 to December 31.
6. Cebu	44	37	7	June 17 to December 31.
7. Iloilo	1	1	0	July 8 to July 21.
8. Isabela	13	9	4	February 7 to August 15, and from August 22 to December 31.
9. Lanao	1	1	0	May 26 to June 9.
10. Leyte	18	17	1	July 27 to August 6 and from August 10 to December 31.
11. Masbate	3	1	2	July 27 to August 6 and from August 10 to December 31.
12. Mindoro	1	1	0	January 3 to January 31.
13. Misamis	8	3	5	January 3 to December 31.
14. Mountain Province	13	7	6	January 3 to December 31.
15. Nueva Ecija	17	17	0	May 11 to August 17.
16. Nueva Vizcaya	8	6	2	March 7 to December 31.
17. Occidental Negros	2	2	0	July 29 to September 12.
18. Oriental Negros	23	23	0	June 14 to December 10.
19. Sulu	1	0	1	September 12 to December 31.
20. Surigao	1	1	0	June 13 to June 25 and from July 3 to August 3.
21. Tayabas	7	5	2	January 3 to December 31.
22. Zamboanga	6	6	0	January 12 to November 7.
Grand total	236	185	51	

Provinces infested with locust during the year 1925	22
Provinces freed from locust infestation during the year	11
Provinces still infested	11

Provinces doing extermination work under Act No. 2472.—All the provinces listed in Table 4 did extermination work under Act No. 2472 except the Province of Cagayan.

Provinces enforcing Act No. 3146.—Act No. 3146 was enforced in the Province of Cagayan with difficulty, rejected in the Province of Bohol; and being considered in the Provinces of Camarines Norte and Nueva Vizcaya.

The work of the provinces.—Under Act No. 2472 most of the provinces rendered excellent service with little or no financial assistance from the Bureau of Agriculture. There were some cases of official negligence, however, that had to be taken up with the executive authorities.

The work of the Bureau of Agriculture.—Locust inspections were made by the Bureau in all the infested provinces, except in the Provinces of Lanao, Masbate, Sulu, and Surigao.

Locust scouting.—The same general plan was followed in the year under consideration as in 1924. The work started in the Provinces of Bohol, Cagayan, Isabela, Mindoro, Mountain Province, Nueva Ecija, Nueva Vizcaya, and Tayabas, was resumed in April and extended to the Provinces of Bukidnon, Cotabato, Misamis, and Zamboanga.

Scouting parties, with the aid to the Bureau's airplane, were mainly responsible for cleaning up Mindoro, which was reported infested from January 3 to 31, and remained free of locusts the rest of the year. Thereafter, the airplane was used in locating the breeding places of the locusts, until it had to be shipped to Manila in August, 1925, for overhauling.

The following are the total quantities of locusts destroyed and the amount of damage done to crops by the locusts during the year 1925: 691 cavans and 20 gantas of eggs; 35,458 cavans and 21 gantas of hoppers; and 13,521 cavans and 15 gantas of fliers. The crops damaged were 770 hectares of rice; 5,747 hectares of copra; 410 hectares of sugar cane; 54,045 hectares of coconut; and 267 hectares of miscellaneous crops.

Inspection of incoming and outgoing plant materials.—Imported and exported plant materials were inspected by the personnel of the Plant Quarantine Service in the ports of Manila, Iloilo, and Zamboanga. All vessels from foreign countries (including round-the-world tourist ships) were boarded and searched for contraband plant materials.

Six permits were issued for the importation of prohibited plant materials for food and propagation purposes. Those for

propagation were quarantined in isolated places on land belonging to the permittees.

One thousand eight hundred seventy-one parcels of plant materials were inspected in the post office.

Between 400 and 500 parcels of contraband plant materials were intercepted by the plant quarantine inspectors during the year. These were mostly sugar cane, citrus, rice, bamboo, and pineapples.

There were also slight violations of the plant quarantine rules and regulations, for example, the removal of plant materials from the piers, without their having been previously inspected and certified to by a plant quarantine inspector. The offending parties were duly admonished.

Inspections of fields, orchards and gardens for the control of pests and diseases.—Inspections were made of fields, orchards and gardens in serious cases and control measures were given for pests and diseases. Among the insects, rice, sugar-cane and coconut pests were the most common. Of plant diseases, those affecting rice, citrus, abaca, bananas, coconuts, sugar cane, coffee and tobacco were the most important.

Collection and identification of pests and diseased plant specimens.—A collection is being made of representative specimens found by inspection work of plant pests and diseased plant materials and accounts of their life, habits and control measures were recorded.

Survey and eradication of coconut bud-rot and other diseases and pests of coconuts.—No Insular coconut bud-rot inspectors could be appointed for lack of funds but allotments were made to certain provinces for this work. Inspections were also made to discover palm weevils, coconut beetles and other pests and diseases.

In the Provinces of Laguna, Zamboanga, Cavite, Tayabas, and Batangas a total of 7,514,294 trees were inspected and 11,563 cases of bud-rot were found, 11,253 of which were destroyed. There were also discovered 29,253 cases of red beetle, 32,746 of black beetle and 8,358 of stem-bleeding.

Survey and eradication of abaca diseases and pests.—The work along this line started last year was continued but only by two junior plant inspectors, one of whom is still in Albay and the other in Davao.

Bunchy-top was found present in Batangas, Camarines Norte, Camarines Sur and Tayabas; heart-rot in Samar and Zam-

boanga; while both bunchy-top and heart-rot were found affecting Cavite, Davao, Laguna, and Leyte.

Survey and eradication of the parasite loranthus and bark-rot disease of citrus.—This dangerous parasite was reported in Batangas principally and with the coöperation of the officials of that province, the fieldmen of this Bureau started the work of eradicating it. A total of 52,456 citrus trees were inspected; 9,382 cases of loranthus and 7,520 of bark-rot were found. Number of trees dead: 1,839; trees treated, 4,898.

Entomological and phytopathological research work.—The principal researches on various insect pests and diseases reported last year have been continued, although the studies were necessarily interrupted by the large amount of routine and field inspection work that has been done.

Among the insects were the cabbage caterpillar, the citrus bark beetle, rice worms, the mango twig-borer; and among diseases, heart-rot and root-rot of abaca, coconut diseases, tobacco wilt diseases and diseases affecting the papaya, avocado, mango, etc., and various ornamental plants.

Cyanogas.—Experiments with cyanogas (*calcium cyanide*) proved it to be a valuable insecticide. Red ants and white grubs were readily killed. Undoubtedly it can be used for dusting seed-beds, tobacco seed-beds, for example, to kill the insects that steal the seeds. It also kills rats and mice.

Beekeeping.—Three small colonies of Italian bees were raised from the one colony left last year. Each of the four colonies has a young queen but no growth of these colonies was noted from August to December, due to the prevalent typhoons and heavy rains and the scarcity of nectar-producing flowers.

ANIMAL HUSBANDRY WORK

Conditions were in general favorable for the work of the Animal Husbandry Division, there having been no big typhoons or severe outbreak of disease.

The year showed a marked increase in the already big demand for the pure bred and selected grade animals—horses, cattle, goats, pigs, and poultry and their eggs. There is always a waiting list for every kind of animal raised under the supervision of this division.

Two Arabian stallions, 1 Welsh pony, 1 Aryshire bull, 3 Nubian goats, 1 Shropshire ram, 3 pure bred pigs, 18 pure bred chickens, and 12 Squab Homer pigeons, with a total value of ₱7,704.78 were imported for the Bureau.

There were also purchased, during the year, 10 horses valued at ₱2,835 for breeding purposes; 339 head of cattle worth ₱20,670.80 and 15 head of carabao for ₱1,215 for the production of virus and 4 horses costing ₱984 for work purposes. For the Bureau of Health the Bureau bought 10 carabaos valued at ₱1,430 and 6 rabbits for ₱30; for the Province of Bukidnon it imported an Arabian stallion costing ₱1,206.65 and also one of the same value for the Province of Zamboanga, while a horse worth ₱150 was purchased under Act 2758.

Public breeding.—Practically every effort made this year to extend the public breeding work to more remote towns has been unavailing due largely to the prevailing shortage of funds. The only new public breeding work done was in the non-Christian regions. The main difficulty in the already established stations is the distance the owners of live stock would have to travel to bring their female animals to these centers.

Number of sires served during the year

Kind	Number of sires	Number of services	Number of offspring	Increased value
Stallions	14	409	282	₱14,100.00
Bulls	24	800	347	17,350.00
Boars	36	685	1,873	18,730.00
Rams	1	.....	19	38.00
Bucks	6	87	119	238.00
Total	81	1,181	2,679	50,956.00

As regards the coöperative public breeding work conducted through other Government entities, it has been on the whole a failure mainly because of the absence of any genuine interest in animal husbandry, the lack of proper feed and poor care and management. Many of those in charge do not even attend to the breeding reports regularly.

The Santa Barbara Provincial Nursery and Poultry-Swine Station, the Indang Farm School, the Bukidnon, Central Luzon, and Pampanga Agricultural Schools, and the College of Agriculture, however, realized a fair income from the sale of the offspring of the original stocks besides supplying the students' mess with meat and eggs. The income of these stations as well as whatever is raised or produced go to the institution maintaining the animals.

Standing of Coöperative Stations:

Number of coöperative stations at beginning of year	20
Number of coöperative stations at close	11
Number of coöperative stations existing	9

The division closed its poultry-swine station in La Paz, Iloilo, because of the prevalence of contagious parasitic diseases on the premises.

The total income of this division from the sales of live stock and other products of its stations amounted to ₱22,287.33.

Alabang Stock Farm.—The work of the Alabang Stock Farm was generally satisfactory, barring the deaths among the sheep and goat herds towards the end of the rainy season due to a virulent attack of stomach worms. This was, however, controlled by dosing the animals with copper sulphate solution in much the same manner as is done in South Africa.

La Carlota Experiment Station.—Livestock raising in this station was successful in general, the pasturage being good and the weather conditions favorable due to the even distribution of rainfall throughout the year.

Various experiments were continued and one on castration of cattle and carabaos at different ages was tried to determine the best age at which to castrate. Only Indian grade bulls undesirable for breeding purposes were used. Observations made this year are that young castrated animals fatten more easily than old ones and the older the animal the more pronounced and apparent is the neck development.

Cebu Breeding Station.—The public breeding station is credited with 111 services and 277 offspring for the year and its income from sales of its stock was ₱1,052.69.

Batangas Breeding Station.—There are seven public breeding stallions, and all rendered 335 services on 258 mares. The number of foals reported for the year was 98.

The three Indian bulls are rendering good services in different herds in Batangas and 55 calves are credited to them.

The breeding boar served 39 sows and has 189 pigs to his credit this year.

The income from sales of pigs, poultry, and eggs and the fees collected for the services of the stallions amounted to ₱529.20.

La Paz Poultry-Swine Station.—This station was closed in the middle of the year due to the prevalence of animal diseases on its premises. The animals and poultry were sold for ₱369.30 except the Indian bulls, which are now in different herds in the Province of Iloilo.

Pandacan Poultry-Swine Station.—Sales from stock at Pandacan amounted to ₱76.

San Antonio Pounltry-Swine Station.—Early in the year the animals in this station were transferred to San Narciso, a town

north of San Antonio, as the former would not provide funds for the rent of the land. The free public breeding is thus now benefiting the San Narciso people. The Indian bull is rendering good service for both towns, being credited with 33 calves, while the boars are credited with 27 services and 141 pigs. The income from sales amounted to ₱206.32.

Oriental Negros Breeding Station.—This station was not successful in producing forage and grain crops due to heavy rains this year. The shortage of funds for labor provided by the province hindered the progress of the work in general. This station keeps a public breeding stallion, bulls, boars, a ram and a billy goat, besides raising pigs and chickens. The stallion was only sent to that station recently. The three Indian bulls are in different herds and are credited with 89 calves for the year; the boar with 22 services and 80 pigs, and the ram and billy goat with 19 lambs and 45 kids, respectively.

Larena Poultry-Swine Station.—This station was established in the Subprovince of Siquijor and is maintained by the subprovincial government. Pigs and chickens are being raised for sale and a boar for public breeding is at the disposal of the public.

Bayombong Cattle Breeding Station.—Four Indian bulls were loaned this year. These are credited with 54 calves which is 32 more calves than that reported for 1924. The number of cows going with these bulls was 197 as against 178 head in 1924.

A trio of sheep and one riding horse were added to the stock this year. The number of cattle at the end of the year was 84 and the increase of 7 sold for ₱1,259.

VETERINARY

Importation from Foreign Ports.—During the year 1925 there arrived at the port of Manila 8,128 cattle from Australia, 1,301 cattle and 286 carabaos from Pnom-Penh, French Indo-China, 2 head of cattle from Japan, and 1 from the United States. Five hundred forty-four carabaos arrived at Iloilo from Pnom-Penh. This constitutes a decrease of 570 cattle and 1,968 carabaos as compared with the figures for 1924.

Interisland shipments.—There came to Manila from interisland ports 11,660 cattle against 14,686 during the preceding year. Carabaos numbered 2,089, an increase of 196 from 1924.

Inspection for which fees were collected.—A total of 148,258

animals of all kinds were inspected upon arrival at Manila, for which fees amounting to ₱20,645.05 were charged and collected. Of these animals, 121,524 were swine.

Postmortem inspection in Azcarraga Abattoir.—There were 131,390 animals of all kinds inspected, of which 130,412 were passed for food and 976 condemned. The number slaughtered includes 118,763 swine.

Postmortem inspections in Pandacan Matadero.—Nine hundred nine animals were inspected and slaughtered at this matadero in 1925, of which 3 were condemned and 704 passed for food.

Postmortem inspections in Sisiman Matadero.—At Sisiman 8,846 Australian cattle were slaughtered, of which 130 were condemned and 8,716 passed for food.

Rinderpest.—During the year there were reported 14,143 cases of rinderpest and 10,747 deaths from this disease. In 1924 there were 19,599 cases and 16,932 deaths. Twenty provinces were infected at one time or another during the year. At the beginning of the year, there were 34 municipalities infected in 11 provinces and on December 31, 1925, there were 27 in 11 provinces. There were 197 outbreaks of rinderpest, counting each time a municipality was taken up as infected or reinfected as a separate outbreak.

Ilocos Sur, La Union, and Mountain Province comprised the new territory invaded. These regions had not been infected to any considerable extent since 1912 and the toll taken by the disease was rather heavy by reason of the large number of susceptible animals that have grown up since the great epidemic over ten years ago.

Rinderpest vaccine.—This product was used extensively in the provinces of Pangasinan, Ilocos Sur, and others. It has given satisfactory results, but where the infection is severe, it was found that as much as five injections were necessary to confer a strong enough immunity toward off infection.

As in the previous years no money was appropriated to reopen the stations for simultaneous immunization against rinderpest. However, carabaos and cattle were immunized by this method at the Pandacan Quarantine Station at cost to owners.

Anthrax—No epidemic of this disease made its appearance during the year, but there were minor sporadic outbreaks in the provinces of Bataan, Bulacan, Nueva Ecija, Pampanga, Panga-

sinan, and Tarlac which were promptly dealt with by vaccination. A total of 591 cases and 558 deaths were registered. A total of 62,842 animals were vaccinated against anthrax.

Septicemia hemorrhagica.—Sporadic cases were reported in the provinces of Albay, Bohol, Camarines Norte, Camarines Sur, Cebu, Mountain Province, and Sorsogon.

Contagious bovine pleuro-pneumonia.—As previously experienced a few chronic cases were discovered now and then in the various shipments of Australian cattle slaughtered in the Sisiman slaughterhouse.

Surra.—Small outbreaks were reported in Camarines Sur, Cagayan, Mountain Province, Sorsogon, and Mindoro during the year. All infected animals were slaughtered.

Glanders.—None reported.

Contagious abortion.—None reported.

Foot-and-mouth disease.—Two outbreaks were reported during the year, one in Cotabato and another in Bukidnon. Relatively few deaths occurred and these mostly among sucking animals.

Veterinary Research Laboratory.—The activities in this laboratory consisted mainly of diagnostic work, the manufacture of rinderpest vaccine and anti-rinderpest serum, the immunization of work animals against rinderpest by the simultaneous method, and investigation to find the best method of manufacturing rinderpest vaccine.

RURAL CREDIT

The work done by the Rural Credit Division this year was largely a continuous hammering at all the associations with a view to getting those which have been more or less mismanaged by unworthy directors back to a proper manner of functioning, and to stirring up those which have been found stagnating, and stimulating those which have shown progress.

While more or less difficulty was experienced in collecting loans due and Court action had to be resorted to in some instances, mainly to make an example of the unscrupulous borrowers, the total amount collected last year exceeded the division's expectations.

During the year, with the coöperation of all the provincial treasurers and district auditors, all the municipal treasurers

who act as ex-officio treasurers of the agricultural credit cooperative associations were bonded in the Fidelity Fund, with the exception of the municipal treasurers in some 40 municipalities.

Such associations as were unable to pay their loans obtained from the Rice and Corn Funds applied for extensions under provisions of Act 3039. So far, the coöperation of provincial fiscals has been asked in only four cases, viz:

Goa, Camarines Sur; Carigara, Leyte; Naic, Cavite; and Capiz, Capiz.

All the rest are, it is safe to say, are paying with reasonable promptitude.

The following shows the operations for 1925:

Amount due and unpaid from instalments, January 1, 1925	₱261,068.99
Amount collected during 1925	279,050.45
Amount loaned during 1925	86,950.00
Amount due and unpaid for instalments, December 31, 1925	114,016.66

Since all the municipal treasurers have not yet submitted their trial balances as of December 31, 1925, a complete statement of the present financial condition of all the rural credit associations for the year 1925 cannot be given but the partial list so far received shows that there has been a substantial increase of capital and loans.

	Dec. 31, 1923	Dec. 31, 1924
Number of associations	547	546
Number of members	77,479	81,971
Number of borrowers	26,945	28,725
Number of depositors	3,107	2,699
Cash on hand	₱110,223.90	₱114,907.19
Loan to members	2,488,835.61	2,531,996.62
Property account	3,295.32	4,547.73
Other items	2,688.64	2,330.33
Capital stock	872,668.00	890,621.00
Deposits	109,536.59	103,378.54
Rice and Corn Fund	1,023,510.24	967,302.16
Philippine National Bank	3,448.44	1,434.26
Other deposits	6,596.62	12,316.60
Surplus "A," entrance fee	19,912.01	18,582.74
Surplus "B," interest	536,939.79	598,518.42
Dividend account	11,979.40	30,481.85
Reserve fund	18,299.53	28,113.67
Other items	2,146.56	3,032.55
Total A. & L.	2,605,043.47	2,653,781.87

During 1924, 1,780 new members joined the associations in spite of the hard times.

A new rural credit association was organized in Infanta, Tayabas, during 1925, and the rural credit associations of San Ildefonso, Bulacan; and Alegria, Cebu, were dissolved at the petition of the members.

FIBER GRADING AND INSPECTION

The inspection of fibers, particularly abaca fiber, was more rigid during 1925 than during any previous year. Of the total production of abaca, canton, and pacol fibers, 1,109,304 bales were certified as abaca of normal strength, 99,996 bales as abaca damaged, 33,678 bales as canton, and 2,263 bales as pacol fiber. A total of 135,937 bales were certified as damaged and weak fiber, which was about 11 per cent of the total production. The largest percentage of fiber certified as weak and damaged during any previous year was in 1924, when it was 4.4 per cent.

The following shows the total number of bales of different kinds of fiber grades, baled, inspected and certified during 1925: Abaca, miscellaneous grades: 1,075,851 bales; for tagal braid, 220; Maguey, retted: 183,823 bales; machine cleaned: 319; Sisal, retted: 2,813 bales; machine cleaned: 246; Canton, miscellaneous grades: 33,678 bales; and Pacol of the same grades, 2,263 bales.

During the year Act 3263, effective July 1, 1926, was passed by the Legislature. It provides for the transfer of the fiber inspection work of the Fiber Division of the Bureau to a service to be called the Philippine Fiber Inspection Service and to be controlled by a Fiber Standardization Board consisting of the Director of Agriculture as chairman and executive officer, and of two members to represent the producers, two fiber exporters, and of one manufacturer and one middleman.

There were 31 fiber grading stations and 138 fiber grading establishments in the Philippine Islands during the year 1925, distributed in fourteen provinces.

AGRICULTURAL PUBLICITY

During the year which ended December 31, 1925, the number of publications issued far exceeded that in previous years. The total number released during the year was 133 as against 49 in 1924, an increase of 84 and were as follows: one annual report; 3 bulletins; 4 number of the Philippine Agricultural Review; 39 new circulars; 70 circulars republished; and 8 miscellaneous

publications. The number of publications distributed was 59,002 as against 46,464 the previous year.

Comparative Table for 1924 and 1925

Title of publications	Number of publications issued			Number of publications distributed		
	1924	1925	Increase (+) or decrease (—)	1924	1925	Increase (+) or decrease (—)
Annual report	1	1	0	1,835	1,691	+ 144
Agricultural Review	4	4	0	5,930	5,919	+ 11
Bulletins	1	3	+ 2	1,678	3,899	+2,221
Circulars	27	109	+82	35,068	44,268	+9,200
Miscellaneous	16	8	— 8	1,953	2,225	+ 272
Reprints	N. R.	4	+ 4	N. R.	300	+ 300
Posters	0	4	+ 4	0	700	+ 700
Total	49	133	+84	46,464	59,002	+12,538

THE PHILIPPINE AGRICULTURAL REVIEW

Besides the four numbers of the Review published during the year a supplement was also published containing the biography of the late Dir. Adriano Hernandez. The total number of copies distributed was 5,910.

BULLETINS

Three bulletins were published during 1925 entitled as follows: No. 39, "The Food Plants of the Philippines," third revised edition, by P. J. Wester; No. 40, "Agricultural Credit Coöperative Associations in the Philippines," by Julian C. Balmaceda; and the Spanish edition of the latter which serves as a guide to the rural credit associations in the provinces.

CIRCULARS

Thirty-nine new circulars were published and 70 old ones were ordered republished as against 15 and 12, respectively, for the previous year or an increase of 24 new circulars and 58 old ones or a total increase of 82 circulars. The following are the new circulars published:

No. 137—Tobacco Growing in the Cagayan Valley, by Domingo B. Paguirigan. English.

No. 147—A Catechism on Leaf Tobacco Production, by the Plant Industry Division. English, Spanish, Ibanag, and Ilocano.

No. 152—The Chayote, by P. J. Wester. English.

No. 153—Coconut Stem-Bleeding Disease, by Dr. N. G. Teodoro. English.

No. 154—The Avocado and Its Propagation, by P. J. Wester. English and Spanish.

No. 155—A Guide for Examination of Diseased Plants and for Sending Specimens of the same to the Bureau of Agriculture for Identification, by Dr. N. G. Teodoro. English.

No. 156—A Guide for Sending Insect Pest Specimens to the Bureau of Agriculture for Identification, by F. Q. Otanes. English.
No. 157—Aeginetia indica in Cane Production, by Dr. N. G. Teodoro.
No. 158—Table Showing Planting Distances for Fruit Trees in the Philippine Islands, by the Plant Industry Division. English and Spanish.
No. 159—The Rice Stem Borer—"Accip na Pula o Apayang Pula" (Tagalog), "Guetaquet" (Pangasinan), by F. Q. Otanes. English.
No. 160—The Rice Bug (Leptocorisa acuta, Thunberg), by F. Q. Otanes. English.
No. 161—Suggestions for the Care of Budded and Grafted Plants, by the Plant Industry Division. English.
No. 162—A Descriptive List of Some Forage Grasses for Distribution by the Bureau of Agriculture for Trial Planting, by the Plant Industry Division. English.
No. 163—A Descriptive List of Some Sugar-Cane Varieties Recommended for Trial Planting by the Bureau of Agriculture, by the Plant Industry Division. English.
No. 164—A Catechism on Mongo Production, by F. Octubre. English.
No. 165—Resin-Kerosene Solution, Effective Poison for Locusts, by the Pests Control Division. English.
No. 166—The Toy Beetle (Leucopholis irorata Chevr.) in the Philippines, a Serious Pest, by F. Octubre. English.
No. 167—The Growing of Sugar Cane in the Philippines, by S. Asuncion. English.
No. 168—Anthracnose of Eggplant, by J. R. Bogayong. English.
No. 169—Blight of Gabi (Phytophthora Colocasiae Rae) by Eliseo T. Gomez. English.
No. 170—Sugar Cane Smut, by S. L. Marquez. English.
No. 171—Diseases of Tobacco (Nicotiana tabacum L.) in the Philippines, by F. M. Clara. English.
No. 172—Method of Planting Abaca Seeds, by the Plant Industry Division. English and Spanish.
No. 173—Leaf Blight of Corn (Caused by Helminthosporium inconspicuum Cke. et Elle.), by Severo L. Marquez. English.
No. 174—Fiji Disease of Sugar Cane, by Severo L. Marquez. English.
No. 175—The Cabbage Caterpillar (Cro. binotalis Zell), by Pedro Sison. English.
No. 176—Banana Diseases in the Philippines, by F. B. Serrano. English.
No. 177—The Citrus Bark Borer (Agrilus occipitalis Eschsch), by J. P. Tan. English.
No. 178—Castration of Animals, by the Animal Husbandry Division. English.
No. 179—Coconut Diseases and Their Control, by Dr. N. G. Teodoro. English.
No. 180—The Planting of Fruit Trees, by F. G. Galang. English.
No. 181—A Guide for Visitors to the Lamao Experiment Station of the Bureau of Agriculture at Lamao, Bataan, by the Plant Industry Division. English.
No. 182—Quarantine Procedure to Guide Importers and Exporters of Plant Materials, by Dr. N. G. Teodoro. English.

No. 183—Rice Diseases and Their Control, by Dr. N. G. Teodoro and J. R. Bogayong. English.
No. 184—Brief Notes on the Carabao, by Carlos X. Burgos. English.
No. 185—Pointers on Goat Raising, by Carlos X. Burgos. English.
No. 186—Descriptive List with Cultural Directions of Tobacco Varieties Grown and Distributed by the Bureau of Agriculture, by the Plant Industry Division. English.
No. 187—Rubber Tree Diseases and Their Control, by Dr. N. G. Teodoro, English.
No. 188—Plant Pests and Diseases: Their Nature and Methods of Control in General, by Dr. N. G. Teodoro. English.

Besides the above new circulars, 69 circulars were republished.

The total number of circulars distributed was 44,268 as against 35,068 in 1924, an increase of 9,200. The distribution by languages was as follows:

	Number of copies
English	9,850
Spanish	17,736
Dialects	16,532

REPRINTS

Four reprints were ordered during the year. These were of important articles published in the Philippine Agricultural Review.

MISCELLANEOUS PUBLICATIONS

Eight miscellaneous publications were published, the most important of which were a pamphlet entitled "The Bureau of Agriculture—The Farmers' Bureau," containing an exposition of the work of this Bureau; another containing a compilation of the lectures of some of the technical personnel of this Bureau, broadcasted through the radio; and three pamphlets on poultry in Tagalog.

POSTERS

Four posters were printed during the year: One on tobacco, in English and Ibanag; one on livestock; one on poultry and one on the control of white grubs, in English and Tagalog. These were distributed in the provinces.

APPENDIX

TABLE I.—*Comparative statistics on the principal crops of the Philippine Islands for the years ending June 30, 1924 and 1925*

Crops	Area cultivated		Products	Amount produced	
	1925	1924		1925	1924
	Hectares	*Hectares*			
Rice	1,725,500	1,737,910	Rough rice, cavans	45,652,600	41,570,700
Sugar cane	239,470	227,190	Sugar, piculs	10,659,480	7,132,640
			Panocha (small cakes), do	521,030	456,100
			Basi (a beverage), liters	4,315,210	3,880,570
			Molasses, do	4,833,860	2,976,550
Coconuts (average of 190 trees per hectare)	472,050	460,440	Ripe nuts as food, nuts	110,678,000	45,588,000
			Copra, piculs	5,726,800	6,119,150
			Coconut oil, liters	1,993,450	1,865,770
			Tuba (a beverage), do	87,252,230	114,581,800
Abaca	477,110	485,340	Abaca (Manila hemp), piculs	2,853,570	3,125,450
Corn	522,380	533,230	Shelled corn, cavans	7,606,110	7,830,320
Tobacco	71,630	72,090	Tobacco leaf, quintals	910,910	941,800
Maguey	31,100	29,380	Maguey, piculs	456,000	443,010
Cacao	1,400	1,380	Cacao, kilos	1,111,900	1,160,800
Coffee	930	900	Coffee, do	1,178,200	1,173,600
Total	3,541,570	3,547,860			

Crops	Products	Average price in the municipal markets		Value of sugar cane and coconut products in the municipal markets		Total value in the municipal markets	
		1925	1924	1925	1924	1925	1924
Rice	Rough rice	₱4.20	₱4.20			₱192,179,270	₱172,957,290
Sugar cane	Sugar	10.06	14.06	₱107,249,810	₱100,290,970		
	Panochas (small cakes)	8.39	9.50	4,371,010	4,332,820		
	Basi (a beverage)	.15	.17	668,650	651,250		
	Molasses	.09	.13	440,430	392,140		
	Total value of all sugar-cane products					112,729,900	105,667,180
Coconuts (average of 190 trees per hectare)	Ripe nuts as food	.03	.03	3,830,250	1,626,900		
	Copra	10.47	9.39	59,958,920	57,478,020		
	Coconut oil	.43	.41	851,660	758,840		
	Tuba (a beverage)	.08	.07	7,207,150	8,270,610		
	Total value of all coconut products					71,847,980	68,134,370
Abaca	Abaca (Manila hemp)	22.53	13.82			64,296,240	43,186,250
Corn	Shelled corn	4.00	4.20			30,767,250	33,303,960
Tobacco	Tobacco leaf	13.05	12.22			11,891,590	11,505,420
Maguey	Maguey	12.46	8.24			5,682,530	3,649,140
Cacao	Cacao	1.07	1.04			1,189,100	1,206,600
Coffee	Coffee	.71	.69			836,300	806,900
Total						491,420,160	440,417,110

EQUIVALENTS

1 cavan of rough rice equals 44 kilos.
1 cavan of cleaned rice equals 57.5 kilos.
1 cavan of shelled corn equals 58 kilos.
1 picul equals 63.25 kilos.
1 quintal equals 46 kilos.
₱1 (Philippine currency) equals $0.50 (U. S. A. currency).

[Compiled from the official reports submitted by municipal presidents, by ANTONIO PEÑA, *Chief, Division of Farm Statistics*].

TABLE II.—*Palay (rough rice)—Area cultivated and production by provinces for the years ending June 30, 1924 and 1925*

Provinces	Area cultivated		Increase or Decrease	Production		Increase or Decrease
	1925	1924		1925	1924	
	Hectares	*Hectares*	*Per cent*	*Cavans* [1]	*Cavans* [1]	*Per cent*
Abra	15,740	15,210	+ 3	312,300	270,100	+ 16
Agusan	6,740	6,620	+ 2	152,700	133,600	+ 14
Albay	37,210	36,810	+ 1	1,012,700	958,400	+ 6
Antique	30,890	34,540	—11	534,100	645,700	— 13
Bataan	16,550	17,160	— 4	584,300	459,600	+ 27
Batanes	180	250	—28	2,700	3,400	— 21
Batangas	53,240	54,440	— 2	663,400	708,500	— 6
Bohol	48,280	58,220	—17	902,200	994,600	— 9
Bukidnon	2,160	2,540	—15	39,900	41,000	— 3
Bulacan	58,900	57,960	+ 2	1,688,500	1,547,500	+ 9
Cagayan	37,850	37,620	+ 1	980,700	825,800	+ 19
Camarines Norte	6,890	6,910	— 1	148,600	117,300	+ 27
Camarines Sur	47,040	45,600	+ 3	1,231,800	933,100	+ 32
Capiz	64,630	66,550	— 3	1,828,000	1,744,600	+ 5
Cavite	32,510	30,290	+ 7	789,300	671,800	+ 17
Cebu	7,710	8,550	—10	127,600	137,600	— 7
Cotabato	12,710	12,900	— 2	317,200	306,900	+ 3
Davao	12,000	12,840	— 7	268,700	240,800	+ 12
Ilocos Norte	62,580	62,650	— 1	1,296,800	1,002,700	+ 29
Ilocos Sur	41,990	43,250	— 3	861,900	769,000	+ 12
Iloilo	123,510	128,160	— 4	2,828,000	2,962,700	— 5
Isabela	5,460	5,480	— 1	113,300	106,000	+ 7
Laguna	25,100	24,900	+ 1	687,800	595,400	+ 16
Lanao	20,990	20,390	+ 3	616,600	597,800	+ 3
La Union	52,400	48,850	+ 7	1,177,600	840,500	+ 40
Leyte	44,220	43,440	+ 2	1,015,800	870,700	+ 17
Marinduque	14,470	14,060	+ 3	392,000	346,500	+ 13
Masbate	3,700	3,190	+16	78,600	47,900	+ 64
Mindoro	16,600	15,950	+ 4	323,900	266,600	+ 21
Misamis	13,020	12,490	+ 4	414,500	361,500	+ 15
Mountain Province	51,190	53,000	— 3	1,100,700	1,054,500	+ 4
Nueva Ecija	177,710	174,850	+ 2	7,148,000	6,416,700	+ 11
Nueva Vizcaya	11,880	11,070	+ 7	399,000	300,300	+ 33
Occidental Negros	38,520	43,160	—11	857,600	997,800	— 14
Oriental Negros	7,110	7,540	— 6	168,000	153,500	+ 9
Palawan	6,250	5,300	+18	107,300	71,700	+ 50
Pampanga	71,110	73,460	— 3	1,802,000	1,579,000	+ 14
Pangasinan	195,890	188,650	+ 4	7,026,900	6,362,300	+ 10
Rizal	24,410	22,710	+ 7	718,000	559,900	+ 28
Romblon	8,170	8,640	— 5	139,300	146,700	— 5
Samar	22,160	20,740	+ 7	435,100	437,000	— 1
Sorsogon	19,860	20,730	— 4	352,900	335,400	+ 5
Sulu	2,420	1,280	+89	53,400	25,200	+112
Surigao	24,190	24,430	— 1	476,800	439,600	+ 8
Tarlac	80,120	82,820	— 3	1,840,600	1,667,700	+ 10
Tayabas	32,880	34,100	— 4	756,300	704,500	+ 7
Zambales	24,830	25,640	— 3	556,400	486,600	+ 14
Zamboanga	11,530	11,970	— 4	322,800	324,700	— 1
Philippine Islands	1,725,500	1,737,910	— 1	45,652,600	41,570,700	+ 10

[1] 1 cavan = 75 liters = 44 kilos including sack.

TABLE III.—*Palay (rough rice)—Average yield per hectare and average price and value of production in the municipal markets, by provinces, for the years ending June 30, 1924 and 1925*

Provinces	Average production per hectare		Average price per cavan		Total value		Increase or Decrease
	1925	1924	1925	1924	1925	1924	
	Cavans [1]	*Cavans* [1]					*Per cent*
Abra	20	18	₱5.20	₱6.20	₱1,614,440	₱1,680,650	— 4
Agusan	23	20	3.50	2.90	531,750	394,200	+ 35
Albay	27	26	4.40	4.00	4,423,160	3,810,730	+ 16
Antique	17	19	4.00	3.60	2,122,570	2,305,840	— 8
Bataan	35	27	4.70	4.40	2,749,930	2,032,740	+ 35
Batanes	15	14	6.30	6.60	16,950	22,450	— 24
Batangas	12	13	4.80	4.50	3,207,750	3,186,400	+ 1
Bohol	19	17	4.70	4.40	4,273,660	4,429,120	— 4
Bukidnon	18	16	4.50	5.20	180,300	212,400	— 15
Bulacan	29	27	4.20	4.20	7,133,330	6,509,060	+ 10
Cagayan	26	22	5.20	4.30	5,106,750	3,580,500	+ 43
Camarines Norte	21	17	5.10	4.60	754,720	538,250	+ 40
Camarines Sur	26	20	4.30	3.70	5,261,370	3,415,470	+ 54
Capiz	28	26	4.00	3.10	7,319,370	5,486,190	+ 33
Cavite	24	22	4.50	4.90	3,528,780	3,308,480	+ 7
Cebu	17	16	5.00	4.90	637,300	680,190	— 6
Cotabato	25	24	3.70	3.30	1,179,020	999,520	+ 18
Davao	22	18	3.10	4.20	841,000	1,018,440	— 17
Ilocos Norte	21	16	5.80	6.70	7,582,380	6,702,530	+ 13
Ilocos Sur	20	18	5.20	6.90	4,487,340	5,307,820	— 15
Iloilo	23	23	4.50	4.10	12,785,980	12,315,360	+ 4
Isabela	21	19	9.30	6.60	1,169,900	700,240	+ 67
Laguna	27	24	4.20	4.70	2,882,940	2,810,480	+ 3
Lanao	29	29	3.00	2.70	1,861,110	1,640,800	+ 13
La Union	22	17	5.60	5.90	6,544,260	4,959,510	+ 32
Leyte	23	20	4.20	4.10	4,320,590	3,564,590	+ 21
Marinduque	27	25	4.20	3.80	1,658,820	1,336,350	+ 24
Masbate	21	15	3.70	3.70	289,560	177,320	+ 63
Mindoro	19	17	4.20	3.50	1,369,380	941,330	+ 45
Misamis	32	29	4.40	3.70	1,811,680	1,342,500	+ 35
Mountain Province	22	20	6.10	4.90	6,746,390	5,150,610	+ 31
Nueva Ecija	40	37	3.40	3.60	24,421,650	23,160,170	+ 5
Nueva Vizcaya	33	27	5.40	3.30	2,169,750	1,000,020	+117
Occidental Negros	22	23	4.70	3.50	3,996,520	3,457,650	+ 16
Oriental Negros	24	20	4.10	4.10	688,390	625,950	+ 10
Palawan	17	13	4.20	4.40	452,930	319,070	+ 42
Pampanga	25	22	4.10	4.10	7,354,450	6,461,660	+ 14
Pangasinan	36	34	3.60	4.00	25,497,710	25,803,460	— 1
Rizal	29	25	4.40	4.50	3,173,770	2,503,300	+ 27
Romblon	17	17	3.80	4.20	529,280	620,350	— 15
Samar	20	21	3.70	3.90	1,632,060	1,706,180	— 4
Sorsogon	18	16	3.80	4.00	1,357,200	1,347,240	+ 1
Sulu	22	20	4.10	4.20	219,300	107,200	+105
Surigao	20	18	4.00	3.30	1,932,950	1,473,390	+ 31
Tarlac	23	20	3.40	3.70	6,240,240	6,266,250	— 1
Tayabas	23	21	7.20	6 90	5,443,280	4,864,540	+ 12
Zambales	22	19	3.10	3.70	1,712,420	1,808,200	— 5
Zamboanga	28	27	3.00	2.70	964,890	872,590	+ 11
Philippine Islands	26	24	4.20	4.20	192,179,270	172,957,290	+ 11

[1] 1 cavan = 75 liters = 44 kilos including sack.

TABLE IV.—*Sugar cane—Area cultivated and production of sugar and panochas, by provinces for the years ending June 30, 1924 and 1925*

Provinces	Area cultivated		Increase or decrease	Sugar		Panocha	
	1925	1924		1925	1924	1925	1924
	Hectares	*Hectares*	*Per cent*	*Piculs* [1]	*Piculs* [1]	*Piculs* [1]	*Piculs* [1]
Abra	820	630	+ 30	80	60	7,590	4,540
Agusan	200	150	+ 33	230	180	1,380	.....
Albay	1,130	1,020	+ 11	2,750	.....	11,330	8,020
Antique	3,290	3,840	— 14	70,450	76,080	1,100	290
Bataan	4,770	4,290	+ 11	79,180	69,860	.....	.....
Batanes	70	60	+ 17	.....	.....	140	60
Batangas	24,550	27,800	— 12	705,490	601,470	.....	.....
Bohol	1,230	1,020	+ 20	4,080	4,070	20,630	13,630
Bukidnon	140	90	+ 55	.....	.....	1,220	2,550
Bulacan	3,110	2,550	+ 22	58,470	52,880	350	400
Cagayan	270	300	— 10	60	80	1,750	2,380
Camarines Norte	210	190	+ 10	310	.....	2,440	1,790
Camarines Sur	890	870	+ 2	.....	.....	12,300	12,180
Capiz	2,920	3,030	— 4	132,820	116,390	24,110	16,770
Cavite	2,520	2,430	+ 4	64,720	50,350	9,370	19,150
Cebu	6,030	5,010	+ 20	115,580	103,050	19,740	22,770
Cotabato	50	20	+150	.....	.....	1,210	600
Davao	70	70	.....	.....	.....	100	.....
Ilocos Norte	4,070	3,500	+ 16	.....	.....	33,550	26,520
Ilocos Sur	11,220	10,010	+ 12	250,100	263,440	25,470	9,830
Iloilo	15,180	10,600	+ 43	425,790	321,260	.....	.....
Isabela	560	400	+ 40	.....	.....	3,500	3,810
Laguna	8,940	7,980	+ 12	413,240	193,850	58,180	64,870
Lanao	500	430	+ 16	17,760	16,560	570	80
La Union	3,280	3,080	+ 6	37,230	28,960	51,990	59,870
Leyte	1,340	1,010	+ 33	7,260	1,760	18,180	16,460
Marinduque	440	320	+ 37	.....	.....	5,280	3,440
Masbate	150	180	— 17	.....	.....	2,480	2,920
Mindoro	2,550	1,670	+ 53	88,060	74,780	3,030	2,920
Misamis	80	70	+ 14	990	830	620	260
Mountain Province	540	460	+ 17	10	1,560	3,620	1,370
Nueva Ecija	1,500	1,270	+ 18	10,070	9,570	19,360	17,980
Nueva Vizcaya	240	210	+ 14	.....	.....	3,800	3,970
Occidental Negros	68,960	69,480	— 1	5,730,870	3,739,940	.....	.....
Oriental Negros	4,910	4,890	.....	474,450	235,690	20	70
Palawan	20	20	.....	.....	.....	400	350
Pampanga	37,250	35,770	+ 4	1,554,990	808,100	6,000	1,100
Pangasinan	6,270	5,810	+ 8	84,100	77,500	23,420	25,790
Rizal	1,670	1,510	+ 10	21,350	16,040	6,970	7,150
Romblon	10	.....	.....	.....	.....	160	.....
Samar	560	460	+ 22	100	.....	7,240	4,130
Sorsogon	3,280	2,900	+ 13	.....	.....	50,550	42,770
Sulu	110	.....	.....	2,360	.....	.....	.....
Surigao	430	230	+ 87	.....	90	9,990	5,850
Tarlac	11,880	10,530	+ 13	301,970	266,340	51,940	33,220
Tayabas	510	490	+ 4	.....	130	10,800	7,900
Zambales	590	400	+ 47	3,370	720	6,900	5,730
Zamboanga	160	140	+ 14	1,190	1,150	2,250	2,610
Philippine Islands	239,470	227,190	+ 5	10,659,480	7,132,640	521,030	456,100

[1] 1 picul = 63.25 kilos.

TABLE V.—*Sugar cane—Average yield per hectare, average prices and total value, by provinces, for the years ending June 30, 1924 and 1925*

Provinces	Average yield per hectare of sugar and panocha combined		Average price in the municipal markets				Total value of all sugar-cane products in the municipal markets		Increase or decrease
			Sugar per picul		Panocha per picul				
	1925	1924	1925	1924	1925	1924	1925	1924	
	Piculs	*Piculs*							*Per cent*
Abra	9.3	7.3	₱9.00	₱8.33	₱6.91	₱6.87	₱90,160	₱70,870	+27
Agusan	8.0	1.2	9.96	16.17	13.41	.....	35,350	28,200	+25
Albay	12.5	7.9	6.00	.....	9.27	8.18	124,100	67,280	+84
Antique	21.7	19.9	5.64	10.37	5.09	7.45	403,660	791,460	—49
Bataan	16.6	16.3	7.93	11.48	.....	.....	629,020	802,570	—22
Batanes	2.0	1.0	.....	.....	10.00	10.33	17,490	9,660	+81
Batangas	28.7	21.6	7.18	8.71	.....	.....	5,070,820	5,237,430	— 3
Bohol	20.1	17.3	10.96	10.59	9.22	10.74	234,880	189,540	+24
Bukidnon	8.7	28.3	.....	.....	10.04	10.00	22,270	26,340	—16
Bulacan	18.9	20.9	10.88	14.79	5.00	4.00	650,910	794,550	—18
Cagayan	6.7	8.3	9.33	11.37	9.45	10.23	55,380	57,260	— 3
Camarines Norte	13.1	9.4	10.16	.....	11.22	11.75	30,570	21,250	+44
Camarines Sur	13.8	14.0	.....	.....	7.72	6.71	95,400	83,580	+14
Capiz	53.7	43.9	11.14	12.68	10.80	12.46	1,740,470	1,684,640	+ 3
Cavite	29.4	28.6	8.69	10.22	7.20	8.65	629,860	680,240	— 7
Cebu	22.4	25.1	7.99	10.71	6.22	9.97	1,046,200	1,331,010	—21
Cotabato	24.2	30.0	.....	.....	10.37	11.50	12,550	8,150	+54
Davao	1.4	.....	.....	.....	10.00	.....	8,980	4,660	+93
Ilocos Norte	8.2	7.6	.....	.....	5.03	5.59	605,880	537,950	+13
Ilocos Sur	24.6	27.3	5.00	9.09	8.88	7.86	1,540.980	2,505,650	—39
Iloilo	28.0	30.3	8.67	11.95	.....	.....	3,693,930	3,839,680	— 4
Isabela	6.2	9.5	.....	.....	7.64	7.15	85,810	65,890	+30
Laguna	52.7	32.4	10.84	13.82	14.47	14.56	5,327,670	3,628,430	+47
Lanao	36.7	38.5	10.14	10.27	11.98	14.00	187,720	172,810	+ 9
La Union	27.2	28.8	7.37	9.80	5.59	5.16	636,860	649,050	— 2
Leyte	19.0	18.0	8.91	11.29	10.02	9.92	246,840	185,550	+33
Marinduque	12.0	10.7	.....	.....	10.69	10.68	56,440	36,730	+54
Masbate	16.5	16.2	.....	.....	7.57	16.30	19,180	47,630	—60
Mindoro	35.7	46.5	9.96	9.96	12.02	11.76	913,860	839,170	+ 9
Misamis	20.1	15.6	13.13	14.06	13.55	7.19	21,400	13,540	+58
Mountain Province	6.7	6.4	10.00	5.22	7.03	13.82	55,990	74,720	—25
Nueva Ecija	19.6	21.7	10.89	11.68	8.78	9.15	287,000	288.940	— 1
Nueva Vizcaya	15.8	18.9	.....	.....	11.87	11.74	56,810	170,370	—67
Occidental Negros	83.1	53.8	10.94	15.90	.....	.....	62,868,720	59,450,370	+ 6
Oriental Negros	96.6	48.2	11.72	15.63	12.00	10.71	5,561,670	3,685,390	+51
Palawan	20.0	17.5	.....	.....	10.00	10.00	4,000	3,500	+14
Pampanga	41.9	22.6	9.35	14.64	8.00	11.00	14,595,900	11,858,370	+23
Pangasinan	17.1	17.8	10.81	13.00	9.03	14.48	1,207,680	1,491,700	—19

TABLE V.—*Sugar cane—Average yield per hectare, average prices and total value, by provinces, for the years ending June 30, 1924 and 1925*—Continued

Provinces	Average yield per hectare of sugar and panocha combined		Average price in the municipal markets				Total value of all sugar-cane products in the municipal markets		Increase or decrease
			Sugar per picul		Panocha per picul				
	1925	1924	1925	1924	1925	1924	1925	1924	
	Picus	*Picu s*							*Per cent*
Rizal	17.0	15.3	9.68	12.97	9.07	9.32	273,760	275,570	— 1
Romblon	16.0	.....	.....	.....	12.94	.....	2,070	.....	.....
Samar	13.1	9.0	10.00	.....	7.39	10.65	55,140	44,070	+25
Sorsogon	15.4	14.7	.....	.....	5.71	7.06	289,060	302,320	— 4
Sulu	21.4	.....	9.60	.....	.....	.....	24,910	.....	.....
Surigao	23.2	25.8	.....	19.22	14.17	14.20	141,660	86,930	+63
Tarlac	29.8	28.4	8.46	11.51	5.43	7.66	2,843,040	3.331,930	—15
Tayabas	21.2	16.4	.....	9.54	8.91	11.51	101,040	93,160	+ 8
Zambales	17.4	16.1	7.33	11.12	9.17	7.99	91,100	56,300	+62
Zamboanga	21.5	26.8	10.60	13.98	9.92	9.97	35,710	42.770	—17
Philippine Islands	46.7	33.4	10.06	14.06	8.39	9.50	112,729,900	105,667,180	+ 7

TABLE VI.—*Coconut—Trees cultivated and trees bearing, by provinces, for the years ending June 30, 1924 and 1925*

Provinces	Trees cultivated		Increase or decrease	Trees bearing	
	1925	1924		1925	1924
	Number	*Number*	*Per cent*	*Number*	*Number*
Abra	9,730	8,290	+17	3,670	3,520
Agusan	630,610	577,510	+ 9	285,190	253,620
Albay	4,192,860	4,140,760	+ 1	2,583,370	2,536,720
Antique	482,540	474,800	+ 2	268,220	263,890
Bataan	34,370	34,900	— 2	12,690	12,470
Batanes	19,840	20,080	— 1	10,100	10,270
Batangas	976,530	922,590	+ 6	371,240	363,590
Bohol	2,409,620	2,316,170	+ 4	1,617,590	1,547,830
Bukidnon	5,020	4,310	+16	1,830	1,830
Bulacan	29,750	29,790	.....	4,760	4,840
Cagayan	265,190	264,320	.....	88,160	85,920
Camarines Norte	1,911,120	1,899,730	.....	1,083,050	1,081,090
Camarines Sur	2,169,160	2,242,080	— 3	1,275,540	1,204,980
Capiz	2,281,680	2,350,340	— 3	1,306,110	1,304,010
Cavite	503,660	274,710	+83	200,010	105,450
Cebu	6,740,800	6,592,660	+ 2	4,285,620	4,233,760
Cotabato	533,880	522,230	+ 2	132,870	107,590
Davao	1,141,930	1,109,250	+ 3	422,600	365,160
Ilocos Norte	62,110	54,030	+15	15,310	15,720
Ilocos Sur	133,440	129,420	+ 3	88,800	86,180
Iloilo	1,940,710	1,859,520	+ 4	891,900	911,320
Isabela	18,410	15,010	+23	6,570	6,200
Laguna	9,135,890	9,049,230	+ 1	6,535,190	6,374,650
Lanao	505,960	432,780	+17	273,310	221,340
La Union	188,620	186,060	+ 1	114,520	110,870
Leyte	3,579,910	3,435,610	+ 4	2,408,310	2,304,380
Marinduque	2,169,380	2,128,540	+ 2	1,369,210	1,376,790
Masbate	1,372,230	1,376,290	.....	860,750	764,650
Mindoro	1,998,190	1,881,960	+ 6	676,220	519,020
Misamis	5,053,280	4,993,240	+ 1	3,209,250	3,148,840
Mountain Province	17,560	17,770	+ 3	7,470	10,830
Nueva Ecija	36,070	35,320	+ 2	19,230	18,870
Nueva Vizcaya	7,420	6,010	+23	1,920	1,590
Occidental Negros	1,296,310	1,240,370	+ 4	807,810	780,690
Oriental Negros	1,942,000	1,806,420	+ 7	1,364,620	1,275,760
Palawan	561,750	524,430	+ 7	258,550	242,630
Pampanga	3,650	3,650	.....	3,500	3,500
Pangasinan	2,159,930	2,068,540	+ 4	1,101,310	1,054,880
Rizal	20,520	14,680	+40	1,660	1,010
Romblon	2,003,200	1,926,320	+ 4	1,039,240	976,090
Samar	5,428,700	5,297,510	+ 2	3,427,720	3,393,090
Sorsogon	1,500,010	1,450,790	+ 3	871,740	857,880
Sulu	539,310	495,740	+ 9	375,530	356,520
Surigao	1,322,630	1,275,320	+ 4	918,760	878,740
Tarlac	66,940	65,090	+ 3	42,400	40,120
Tayabas	18,874,350	18,666,260	+ 1	10,383,730	9,829,010
Zambales	266,780	241,390	+10	169,060	166,110
Zamboanga	3,094,220	2,998,180	+ 3	1,969,670	1,940,780
Philippine Islands	89,637,770	87,460,000	+ 2	53,165,880	51,154,600

TABLE VII.—*Coconut—Nuts gathered and tuba produced, by provinces, for the years ending June 30, 1924 and 1925*

Provinces	Nuts gathered		Increase or decrease	Tuba	
	1925	1924		1925	1924
	Number	*Number*	*Per cent*	*Liters*	*Liters*
Abra	63,000	59,000	+ 7	.....	.....
Agusan	10,183,000	6,028,000	+ 69	959,800	1,077,510
Albay	49,827,000	45,800,000	+ 9	1,492,510	1,666,110
Antique	6,023,000	5,193,000	+ 16	1,199,900	1,440,530
Bataan	167,000	84,000	+ 99	.....	.....
Batanes	108,000	36,000	+200	.....	.....
Batangas	14,182,000	10,550,000	+ 34	.....	.....
Bohol	54,076,000	58,637,000	— 8	3,690,150	4,119,570
Bukidnon	40,000	25,000	+ 60	6,000	4,930
Bulacan	187,000	167,000	+ 12	.....	.....
Cagayan	1,485,000	1,416,000	+ 5	.....	.....
Camarines Norte	27,610,000	17,636,000	+ 56	20,000	28,500
Camarines Sur	41,410,000	36,247,000	+ 14	2,114,100	2,662,010
Capiz	25,554,000	20,245,000	+ 26	5,493,180	5,520,770
Cavite	8,903,000	3,494,000	+155	.....	.....
Cebu	111,965,000	130,163,000	— 14	25,870,240	43,500,250
Cotabato	2,500,000	1,769,000	+ 41	51,340	21,460
Davao	9,508,000	8,126,000	+ 17	73,190	71,770
Ilocos Norte	322,000	97,000	+232	.....	.....
Ilocos Sur	1,953,000	2,476,000	— 21	.....	.....
Iloilo	16,293,000	12,172,000	+ 34	16,842,420	23,040,470
Isabela	123,000	123,000	.....	.....	.....
Laguna	271,715,000	294,081,000	— 8	395,150	674,670
Lanao	6,803,000	5,359,000	+ 27	287,850	213,560
La Union	2,474,000	2,745,000	— 10	.....	.....
Leyte	64,853,000	71,021,000	— 9	5,617,700	5,806,790
Marinduque	30,923,000	36,071,000	— 14	547,250	573,590
Masbate	15,933,000	16,071,000	— 1	614,160	488,500
Mindoro	18,681,000	16,598,000	+ 12	384,650	437,200
Misamis	121,592,000	137,454,000	— 12	3,217,110	4,113,400
Mountain Province	60,000	138,000	— 57	.....	.....
Nueva Ecija	199,000	189,000	+ 5	.....	.....
Nueva Vizcaya	25,000	16,000	+ 56	.....	.....
Occidental Negros	23,842,000	21,101,000	+ 13	5,920,050	6,282,450
Oriental Negros	46,565,000	51,920,000	— 10	2,960,930	3,469,030
Palawan	8,807,000	9,791,000	— 10	566,430	469,390
Pampanga	35,000	41,000	— 15	.....	.....
Pangasinan	15,261,000	14,415,000	+ 6	850	.....
Rizal	14,000	5,000	+180	.....	.....
Romblon	23,609,000	23,991,000	— 2	1,401,780	1,629,140
Samar	81,199,000	95,794,000	— 15	2,899,320	31172,660
Sorsogon	23,498,000	19,109,000	+ 23	224,830	223,620
Sulu	8,682,000	9,762,000	— 11	10,170	6,150
Surigao	26,879,000	24,357,000	+ 10	1,876,960	1,966,510
Tarlac	502,000	483,000	+ 4	.....	.....
Tayabas	340,427,000	309,287,000	+ 10	1,299,570	1,182,850
Zambales	3,439,000	3,130,000	+ 10	70,000	62,400
Zamboanga	66,020,000	53,157,000	+ 24	1,144,640	656,010
Philippine Islands	1,584,519,000	1,576,629,000	.....	87,252,230	114,581,800

TABLE VIII—*Coconut—Consumption of fresh nuts and production of copra and oil (home-made), by provinces, for the years ending June 30, 1924 and 1925*

Provinces	Number of nuts consumed for food		Production of coconut products				
			Copra		Increase or decrease	Oil	
	1925	1924	1925	1924		1925	1924
	Thousands	*Thousands*	*Piculs* [1]	*Piculs* [1]	*Per cent*	*Liters*	*Liters*
Abra	53	54	.....	.....	.....	1,000	490
Agusan	504	353	38,780	22,570	+72	2,170	5,900
Albay	3,526	5,168	167,810	152,710	+10	112,450	231,450
Antique	309	718	15,900	13,680	+16	96,410	47,220
Bataan	167	84	.....	.....	.....	.....	.....
Batanes	99	19	.....	.....	.....	740	1,600
Batangas	1,099	1,150	45,290	36,180	+25	1,090	4,040
Bohol	1,044	621	195,860	227,370	— 14	102,960	84,130
Bukidnon	36	23	10	10	.....	.....	.....
Bulacan	187	167	.....	.....	.....	.....	.....
Cagayan	1,404	1,335	.....	.....	.....	7,860	8,050
Camarines Norte	508	284	101,160	73,050	+38	9,600	16,910
Camarines Sur	5,521	2,934	123,760	115,980	+ 7	401,660	307,550
Capiz	774	736	98,770	82,290	+20	19,970	15,090
Cavite	4,147	203	14,940	13,520	+10	1,160	1,310
Cebu	3,098	3,126	400,590	464,460	—14	81,260	126,550
Cotabato	1,335	834	3,860	2,750	+40	21,650	15,270
Davao	1,360	509	32,000	29,550	+ 8	2,820	6,040
Ilocos Norte	253	50	.....	.....	.....	7,490	4,590
Ilocos Sur	1,145	1,485	2,140	2,070	+ 3	30,270	40,220
Iloilo	2,642	877	47,400	41,090	+15	21,620	23,920
Isabela	90	96	.....	.....	.....	3,560	2,600
Laguna	33,001	8,870	923,780	1,221,410	—24	543,030	342,340
Lanao	1,391	923	22,960	18,840	+22	9,690	8,900
La Union	448	582	6,680	6,070	+10	33,550	43,270
Leyte	1,194	965	255,470	289,400	—12	19,650	14,300
Marinduque	104	153	147,890	170,730	—13	800	1,440
Masbate	189	221	62,870	63,710	— 1	5,400	6,760
Mindoro	526	921	63,050	58,990	+ 7	3,980	3,760
Misamis	309	321	479,040	545,780	—12	11,940	11,160
Mountain Province	42	67	.....	.....	.....	1,920	7,010
Nueva Ecija	186	179	.....	.....	.....	1,310	720
Nueva Vizcaya	13	9	.....	.....	.....	1,060	830
Occidental Negros	338	528	87,040	73,450	+18	5,830	10,220
Oriental Negros	324	172	163,340	190,510	—14	4,480	6,660
Palawan	247	256	31,300	34,780	—10	9,970	9,920
Pampanga	35	41	.....	.....	.....	.....	.....
Pangasinan	1,252	1,344	55,410	52,050	+ 6	126,990	150,900
Rizal	14	5	.....	.....	.....	.....	.....
Romblon	107	111	102,670	104,000	— 1	1,530	8,850
Samar	2,384	3,608	319,540	376,490	—15	24,350	55,230
Sorsogon	1,306	1,920	79,350	64,160	+24	49,180	12,800
Sulu	702	1,379	29,780	30,820	— 3	45,760	75,320
Surigao	516	263	108,250	98,770	+ 9	19,840	8,450
Tarlac	223	231	510	400	+27	17,690	18,060
Tayabas	22,913	1,055	1,265,510	1,205,780	+ 5	33,460	34,240
Zambales	571	344	8,630	8,650	.....	51,380	55,880
Zamboanga	13,042	294	225,460	227,080	— 1	44,920	35,820
Philippine Islands	110,678	45,588	5,726,800	6,119,150	— 7	1,993,450	1,865,770

[1] 1 picul = 63.25 kilos.

TABLE IX.—*Coconut—Average prices and total value by provinces, for the years ending June 30, 1924 and 1925*

Provinces	Average price per unit in the municipal markets								Total value	
	Tuba per liter		Nut per 100		Copra per picul		Oil per liter			
	1925	1924	1925	1924	1925	1924	1925	1924	1925	1924
Abra	.....	.....	₱9.26	₱8.26	.....	.....	₱0.45	₱0.76	₱5,310	₱4,820
Agusan	₱0.08	₱0.08	5.14	5.41	₱10.01	₱9.94	.79	.90	493,010	335,260
Albay	.10	.08	3.84	3.89	11.69	10.66	.40	.34	2,286,480	2,043,170
Antique	.11	.09	3.99	2.58	10.96	10.32	.66	.53	377,460	313,770
Bataan	.....	.....	6.11	6.79	.....	.....	.....	.....	10,180	5,700
Batanes	.....	.....	6.19	2.88	.....	.....	.36	.32	6,390	1,080
Batangas	.....	.....	3.33	3.36	10.66	9.67	.35	.35	519,960	390,020
Bohol	.09	.08	2.71	2.90	10.43	9.01	.22	.28	2,435,220	2,404,630
Bukidnon	.05	.08	10.21	6.98	9.00	9.00	.....	.....	4,140	2,030
Bulacan	.....	.....	9.10	8.15	.....	.....	.....	.....	17,020	13,580
Cagayan	.....	.....	5.12	5.71	.....	.....	.71	1.00	77,450	84,380
Camarines Norte	.12	.20	3.42	3.01	10.78	8.91	.37	.33	1,114,720	671,130
Camarines Sur	.06	.06	3.35	2.95	10.05	7.78	.30	.21	1,676,140	1,215,320
Capiz	.08	.07	3.45	3.14	9.24	8.81	.41	.40	1,378,870	1,159,390
Cavite	.....	.....	2.75	3.40	11.88	11.19	.24	.18	291,720	158,470
Cebu	.07	.07	3.75	3.56	10.58	9.97	.28	.33	6,320,730	7,680,100
Cotabato	.21	.15	5.27	5.70	10.93	9.35	.73	.52	139,360	84,370
Davao	.13	.13	5.70	5.29	10.15	9.18	.87	.98	414,220	313,420
Ilocos Norte	.....	.....	9.57	9.12	.....	.....	.56	.48	28,340	6,810
Ilocos Sur	.....	.....	5.06	5.59	11.83	10.00	.76	.74	106,250	133,330
Iloilo	.08	.06	2.93	3.03	10.92	10.38	.67	.71	1,934,830	1,946,740
Isabela	.....	.....	7.78	6.67	.....	.....	.63	1.25	9,260	9,660
Laguna	.13	.02	2.58	2.16	11.29	9.97	.48	.59	11,593,040	12,583,930
Lanao	.07	.10	5.26	3.85	11.28	10.33	.40	.45	356,430	255,970
La Union	.....	.....	3.37	3.70	9.53	8.48	.55	.45	97,310	92,330
Leyte	.11	.10	3.07	2.93	10.81	9.28	.24	.23	3,405,520	3,282,610
Marinduque	.08	.08	3.44	3.23	10.06	8.34	.29	.28	1,535,710	1,476,930
Masbate	.07	.11	2.65	2.78	9.65	8.90	.40	.29	654,850	630,330
Mindoro	.05	.06	3.55	3.43	10.13	8.28	.21	.23	679,670	546,300
Misamis	.06	.05	3.44	2.97	10.03	9.19	.36	.37	5,019,420	5,239,490
Mountain Province	.....	.....	9.33	8.74	.....	.....	.50	.40	4,850	8,710
Nueva Ecija	.....	.....	11.73	9.70	.....	.....	.38	.57	22,310	17,760
Nueva Vizcaya	.....	.....	18.24	12.64	.....	.....	.47	.46	2,890	1,580
Occidental Negros	.08	.08	3.11	2.94	9.55	10.06	.34	.35	1,335,900	1,285,700
Oriental Negros	10	.08	2.65	2.62	9.94	8.41	.39	.49	1,942,030	1,886,370
Palawan	.05	.05	3.33	3.94	9.34	9.65	.24	.23	333,880	373,510
Pampanga	.....	.....	7.32	8.00	.....	.....	.....	.....	2,570	3,260
Pangasinan	.10	.....	4.17	4.13	10.12	9.35	.44	.43	669,770	607,440
Rizal	.....	.....	6.43	9.13	.....	.....	.....	.....	920	440
Romblon	.07	.07	2.61	2.34	11.12	10.93	.29	.16	1,243,980	1,251,550
Samar	.14	.14	3.92	4.06	9.33	8.84	.29	.30	3,486,920	3,955,680

Sorsogon	.12	.09	3.21	3.50	11.14	8.82	.25	.42	965,030	659,830
Sulu	.20	.....	3.86	3.52	11.29	9.46	.37	.37	382,300	367,880
Surigao	.08	.07	2.85	2.57	10.88	8.77	.42	.36	1,349,720	1,016,740
Tarlac	.....	.....	5.14	5.55	10 14	6.50	.44	.41	24,500	22,850
Tayabas	.05	.05	3.64	3.44	10.28	8.96	.50	.51	13,921,690	10,916,960
Zambales	.10	.22	4.83	6.53	7.90	8.29	.41	.44	124,070	132,480
Zamboanga	.09	.10	4.03	4.01	10.54	10.78	.86	.38	3,045,640	2,540,560
Philippine Islands	.08	.07	3.46	3.57	10.47	9.39	.43	.41	71,847,980	68,134,370

TABLE X.—*Abaca—Area cultivated, area productive and production, by provinces, for the years ending June 30, 1924 and 1925*

Provinces	Area cultivated		Increase or decrease	Area productive		Production		Increase or decrease
	1925	1924		1925	1924	1925	1924	
	Hectares	*Hectares*	*Per cent*	*Hectares*	*Hectares*	*Piculs*[1]	*Piculs*[1]	*Per cent*
Abra	.....	.....	.....	.....	.....	.....	.....	.....
Agusan	10,020	10,120	— 1	7,840	7,840	75,690	64,720	+ 17
Albay	79,100	78,060	+ 1	68,040	60,500	503,860	568,660	— 11
Antique	860	860	.....	670	540	1,420	1,350	+ 5
Bataan	.....	.....	.....	.....	.....	.....	.....	.....
Batanes	10	10	.....	(2)	.....	10	.....	.....
Batangas	810	840	— 4	710	780	2,390	1,430	+ 67
Bohol	1,200	1,190	+ 1	720	680	4,190	5,140	— 19
Bukidnon	6,680	5,640	+18	5,110	3,620	33,590	29,820	+ 13
Bulacan	.....	.....	.....	.....	.....	.....	.....	.....
Cagayan	.....	.....	.....	.....	.....	.....	.....	.....
Camarines Norte	10,670	11,760	— 9	8,400	10,070	66,040	54,970	+ 20
Camarines Sur	38,630	36,780	+ 5	33,090	30,170	269,020	215,720	+ 25
Capiz	6,490	5,920	+10	5,310	4,240	34,620	35,390	— 2
Cavite	4,440	4,770	— 7	4,280	4,650	20,030	24,050	— 17
Cebu	3,370	3,390	— 1	2,590	2,610	26,420	25,500	+ 4
Cotabato	680	630	+ 8	390	420	4,540	4,390	+ 3
Davao	43,250	41,630	+ 4	39,310	36,740	356,390	358,410	— 1
Ilocos Norte	.....	.....	.....	.....	.....	.....	.....	.....
Ilocos Sur	.....	.....	.....	.....	.....	.....	.....	.....
Iloilo	2,030	2,000	+ 1	1,370	1,380	15,470	12,380	+ 25
Isabela	.....	.....	.....	.....	.....	.....	.....	.....
Laguna	650	600	+ 8	570	480	7,560	5,120	+ 48
Lanao	1,460	1,380	+ 6	1,050	750	17,680	7,980	+121
La Union	.....	.....	.....	.....	.....	.....	.....	.....
Leyte	96,750	108,940	—11	69,380	79,980	549,540	806,140	— 32
Marinduque	2,210	2,560	—14	1,170	1,290	7,110	10,710	— 34
Masbate	2,780	2,470	+12	2,100	2,260	14,520	19,310	— 25
Mindoro	4,310	4,930	—13	4,210	4,860	23,670	24,260	— 3

[1] 1 picul—63.25 kilos.

[2] Less than 10 hectares.

TABLE X.—*Abaca—Area cultivated, area productive and production, by provinces, for the years ending June 30, 1924 and 1925*—Continued

Provinces	Area cultivated		Increase or decrease	Area productive		Production		Increase or decrease
	1925	1924		1925	1924	1925	1924	
	Hectares	*Hectares*	*Per cent*	*Hectares*	*Hectares*	*Piculs*[1]	*Piculs*[1]	*Per cent*
Misamis	9,570	9,040	+ 6	7,910	6,560	79,050	65,360	+ 21
Mountain Province								
Nueva Ecija								
Nueva Vizcaya								
Occidental Negros	2,850	2,850		1,760	1,910	6,220	6,080	+ 2
Oriental Negros	4,440	4,470	— 1	3,550	2,450	26,470	18,570	+ 42
Palawan	(2)	10		(2)	10	10	30	— 67
Pampanga								
Pangasinan								
Rizal		10						
Romblon	1,160	1,160		860	990	7,930	5,420	+ 46
Samar	42.210	45,460	— 7	32,230	35,230	205,880	296,570	— 31
Sorsogon	58,440	55,380	+ 5	46,080	41,210	279,840	258,270	+ 8
Sulu	10,360	9,980	+ 4	7,940	7,050	31,450	26,480	+ 19
Surigao	24,450	25,340	— 4	20,730	21,180	154,300	154,510	
Tarlac								
Tayabas	850	1,080	—21	780	930	5,870	2,390	+146
Zambales								
Zamboanga	6,380	6,080	+ 5	4,710	2,800	22,790	16,320	+ 40
Philippine Islands	477,110	485,340	— 2	382,860	374,180	2,853,570	3,125,450	— 9

[1] 1 picul = 63.25 kilos.

[2] Less than 10 hectares.

TABLE XI.—*Abaca—Average yield per hectare, average price and value of production, by provinces, for the years ending June 30, 1924 and 1925*

Provinces	Average yield per hectare		Average price per picul in the municipal markets		Total value in the municipal markets		Increase or decrease
	1925	1924	1925	1924	1925	1924	
	Piculs	*Piculs*					*Per cent*
Abra							
Agusan	10	8	₱22.01	₱14.49	₱1,665,660	₱937,900	+ 77
Albay	7	9	21.72	13.42	10,943,960	[1]7,629,620	+ 43
Antique	2	2	18.31	16.46	26,000	22,220	+ 17
Bataan							
Batanes	2		20.00		200		
Batangas	3	2	38.35	25.52	91,650	36,500	+151
Bohol	7	7	17.55	11.97	73,520	61,520	+ 19
Bukidnon	6	8	14.27	16.75	479,190	499,480	— 4
Bulacan							
Cagayan							
Camarines Norte	8	5	29.84	17.01	1,971,020	935,060	+111
Camarines Sur	8	7	19.20	12.34	5,164,420	2,662,060	+ 94
Capiz	6	8	30.77	15.80	1,065,210	559,360	+ 90
Cavite	5	5	40.25	29.11	806,270	700,070	+ 15
Cebu	10	10	25.72	16.49	679,440	420,480	+ 61
Cotabato	12	10	29.67	19.10	134,700	83,840	+ 61
Davao	9	10	27.06	15.47	9,645,410	5,545,880	+ 74
Ilocos Norte							
Ilocos Sur							
Iloilo	11	9	25.77	17.81	398,650	220,530	+ 81
Isabela							
Laguna	13	11	33.48	31.79	253,100	162,750	+ 55
Lanao	17	11	17.38	9.80	307,280	78,180	+293
La Union							
Leyte	8	10	20.26	12.26	11,133,740	9,886,160	+ 13
Marinduque	6	8	32.27	19.08	229,430	204,340	+ 12
Masbate	7	8	13.95	12.82	202,600	247,630	— 18
Mindoro	6	5	30.59	15.34	724,080	372,160	+ 94
Misamis	10	10	16.35	12.68	1,292,600	828,630	+ 56
Mountain Province							
Nueva Ecija							
Nueva Vizcaya							
Occidental Negros	3	3	18.70	15.86	116,310	96,460	+ 20
Oriental Negros	7	7	18.49	9.53	489,430	176,980	+176
Palawan	3	3	10.00	10.67	100	320	— 69
Pampanga							
Pangasinan							
Rizal							
Romblon	9	5	28.24	17.39	223,990	94,240	+138
Samar	6	8	22.28	14.89	4,586,790	4,415,230	+ 4
Sorsogon	6	6	27.80	15.00	7,779,880	3,873,760	+101
Sulu	4	4	15.51	15.63	487,700	413,850	+ 18
Surigao	7	7	18.59	11.94	2,867,840	1,845,150	+ 55
Tarlac							
Tayabas	7	2	11.37	16.87	66,740	40,320	+ 65
Zambales							
Zamboanga	5	6	17.08	8.31	389,330	135,570	+187
Philippine Islands	7	8	22.53	13.82	64,296,240	[1]43,186,250	+ 49

[1] Revised.

TABLE XII.—*Corn—Area cultivated and production, by provinces for the years ending June 30, 1924 and 1925*

Provinces	Area cultivated		Increase or decrease	Production		Increase or decrease
	1925	1924		1925	1924	
	Hectares	*Hectares*	*Per cent*	*Cavans* [1]	*Cavans* [1]	*Per cent*
Abra	14,210	15,750	—10	185,310	165,110	+ 12
Agusan	3,670	3,520	+ 4	57,050	61,130	— 7
Albay	1,750	2,360	—26	20,510	22.040	— 7
Antique	4,470	4,050	+10	52,660	48,090	+ 10
Bataan	530	630	—16	4,840	5,840	— 17
Batanes	150	160	— 6	1,380	2,060	— 33
Batangas	18,370	17,590	+ 4	189,870	142,040	+ 34
Bohol	21,940	20,890	+ 5	263,790	262.890	.....
Bukidnon	4,480	3,480	+29	52,520	29,820	+ 76
Bulacan	4,340	4,490	— 3	35,930	66,820	— 46
Cagayan	22,750	23,730	— 4	509,290	439,900	+ 16
Camarines Norte	220	180	+22	2,800	2,830	— 1
Camarines Sur	870	1,000	—13	11,880	9,550	+ 24
Capiz	4,020	3,060	+31	45,410	40,560	+ 12
Cavite	3,040	2,690	+13	19,240	11,260	+ 71
Cebu	155,940	162,020	— 4	2,436,620	2,922,060	— 17
Cotabato	4,800	4,260	+13	118,720	83,270	+ 43
Davao	2,740	2,210	+24	36,030	24.650	+ 46
Ilocos Norte	7,500	6,360	+18	109,470	112,600	— 3
Ilocos Sur	8,130	7,100	+15	132,020	134,060	— 2
Iloilo	13,690	13,740	— 1	118,130	111,900	+ 6
Isabela	33,160	33,170	— 1	590,490	479,870	+ 23
Laguna	1,020	1,200	—15	13,210	21,090	— 37
Lanao	4,930	5,550	—11	106,440	126,500	— 16
La Union	7,010	7,660	— 8	90,660	99,910	— 9
Leyte	34,650	33,770	+ 3	496,940	444,990	+ 12
Marinduque	230	310	—26	2,930	3,700	— 21
Masbate	2,930	4,010	—27	37,130	54,600	— 32
Mindoro	2,160	2,310	— 6	24,830	23,550	+ 5
Misamis	20,890	21,570	— 3	340,560	354,330	— 4
Mountain Province	2,040	2,130	— 4	20,420	23,870	— 14
Nueva Ecija	6,960	9,970	—30	79,640	60,380	+ 32
Nueva Vizcaya	400	590	—32	5,760	9,790	— 41
Occidental Negros	20,480	28,470	—28	332,460	468,630	— 31
Oriental Negros	40,310	38,730	+ 4	528,310	449,640	+ 17
Palawan	950	980	— 3	7,260	9,710	— 25
Pampanga	6,750	6,970	— 3	36,900	60,690	— 39
Pangasinan	14,770	14,040	+ 5	210,320	187,080	+ 12
Rizal	1,060	920	+15	10,530	8,180	+ 29
Romblon	3,160	1,700	+86	36,190	11,240	+222
Samar	2,280	2,350	— 3	26,050	25,320	+ 3
Sorsogon	3,290	2,910	+13	31,500	27,410	+ 19
Sulu	750	710	+ 6	7,340	6,930	+ 6
Surigao	5,140	4,670	+10	59,140	48,390	+ 22
Tarlac	3,210	2,460	+30	48,630	33,950	+ 43
Tayabas	3,660	3,690	— 1	30,120	32,770	— 8
Zambales	490	410	+20	7,710	5,370	+ 44
Zamboanga	2,090	2,710	—23	31,170	53,950	— 42
Philippine Islands	522,380	533,230	— 2	7,606,110	7,830,320	— 3

[1] 1 cavan of shelled corn = 75 liters or 58.5 kilos.

TABLE XIII.—*Corn—Average yield per hectare, average price and value of production, by provinces, for the years ending June 30, 1924 and 1925*

Provinces	Average production per hectare		Average price per cavan in the municipal markets		Total value in the municipal markets		Increase or decrease
	1925	1924	1925	1924	1925	1924	
	Cavans [1]	*Cavans* [1]					*Per cent*
Abra	13	10	₱5.00	₱3.90	₱921,050	₱643,610	+ 43
Agusan	16	17	4.40	3.80	253,280	230,210	+ 10
Albay	12	9	4.10	4.70	84,660	103,100	— 18
Antique	12	12	3.10	4.60	162,970	222,950	— 27
Bataan	9	9	3.80	5.10	18,540	29,580	— 37
Batanes	9	13	5.00	5.00	6,920	10,220	— 32
Batangas	10	8	4.30	3.80	814,820	543,960	+ 50
Bohol	12	13	4.20	4.50	1,116,370	1,171,560	— 5
Bukidnon	12	9	3.70	4.80	193,490	142,580	+ 36
Bulacan	8	15	4.60	4.80	166,270	318,420	— 48
Cagayan	22	19	3.30	4.40	1,704,930	1,923,120	— 11
Camarines Norte	13	16	3.80	3.30	10,780	9,230	+ 17
Camarines Sur	14	9	3.60	3.30	43,300	31,430	+ 38
Capiz	11	13	3.40	3.10	153,240	127,510	+ 20
Cavite	6	4	4.00	3.90	76,520	44,500	+ 72
Cebu	16	18	4.40	4.40	10,835,930	12,944,490	— 16
Cotabato	25	20	3.30	3.40	387,320	284,880	+ 36
Davao	13	11	3.40	3.80	122,240	94,180	+ 30
Ilocos Norte	15	18	4.30	4.40	472,320	494,170	— 4
Ilocos Sur	16	19	4.50	5.00	594,600	671,890	— 12
Iloilo	9	8	3.80	4.10	450,790	456,450	— 1
Isabela	18	14	3.30	3.70	1,956,930	1,758,980	+ 11
Laguna	13	18	4.50	3.80	59,160	80,350	— 26
Lanao	22	23	3.90	4.20	412,420	530,940	— 22
La Union	13	13	4.10	6.20	372,640	620,290	— 40
Leyte	14	13	4.10	3.90	2,031,130	1,738,840	+ 17
Marinduque	13	12	2.90	2.70	8,400	10,020	— 16
Masbate	13	14	3.10	3.60	113,700	194,710	— 42
Mindoro	11	10	3.00	3.10	75,260	74,070	+ 2
Misamis	16	16	3.60	3.70	1,229,730	1,302,780	— 6
Mountain Province	10	11	3.90	4.10	80,390	98,810	— 19
Nueva Ecija	11	6	4.20	4.40	333,310	267,880	+ 24
Nueva Vizcaya	14	17	5.00	4.40	28,800	42,750	— 33
Occidental Negros	16	16	4.20	4.80	1,343,190	2,273,650	— 41
Oriental Negros	13	12	3.80	4.30	2,027,730	1,923,820	+ 5
Palawan	8	10	4.90	5.20	35,850	50,890	— 30
Pampanga	5	9	3.80	3.90	139,880	239,590	— 42
Pangasinan	14	13	4.10	3.60	863,000	678,380	+ 27
Rizal	10	9	4.60	4.80	48,410	39,010	+ 24
Romblon	11	7	3.30	2.50	118,810	28,440	+318
Samar	11	11	4.10	3.80	109,050	95,230	+ 15
Sorsogon	10	9	3.10	3.70	99,010	102,070	— 3
Sulu	10	10	4.10	4.50	30,320	31,340	— 3
Surigao	12	10	2.90	2.80	172,650	135,250	+ 28
Tarlac	15	14	4.00	4.30	192,330	147,680	+ 30
Tayabas	8	9	4.80	4.40	145,520	143,430	+ 1
Zambales	16	13	4.10	3.40	31,590	18,520	+ 71
Zamboanga	15	20	3.80	3.30	117,700	178,200	— 34
Philippine Islands	15	14	4.00	4.20	30,767,250	33,303,960	— 8

[1] 1 cavan of shelled corn = 75 liters or 58.5 kilos.

TABLE XIV.—*Tobacco—Area cultivated and production, by provinces, for the years ending June 30, 1924 and 1925*

Provinces	Area cultivated		Increase or decrease	Production		Increase or decrease
	1925	1924		1925	1924	
	Hectares	*Hectares*	*Per cent*	*Quintals*[1]	*Quintals*[1]	*Per cent*
Abra	1,350	1,760	— 23	14,120	15,360	— 8
Agusan	390	285	+ 37	3,510	3,110	+ 13
Albay	.....	.....	.....	.....	.....	.....
Antique	200	245	— 18	1,110	1,330	— 17
Bataan	.....	.....	.....	.....	.....	.....
Batanes	20	20	.....	120	100	+ 20
Batangas	120	120	.....	770	650	+ 18
Bohol	460	465	— 1	4,950	5,710	— 13
Bukidnon	120	90	+ 33	1,310	950	+ 38
Bulacan	70	65	+ 8	360	280	+ 28
Cagayan	13,280	12,695	+ 5	183,330	199,780	— 8
Camarines Norte	.....	.....	.....	.....	.....	.....
Camarines Sur	10	.....	.....	30	.....	.....
Capiz	150	170	— 12	1,090	1,330	— 18
Cavite	60	30	+100	530	420	+ 26
Cebu	4,620	6,150	— 25	83,680	110,180	— 24
Cotabato	170	100	+ 70	2,090	1,390	— 50
Davao	100	100	.....	900	850	+ 6
Ilocos Norte	3,890	2,845	+ 37	44,710	36,060	+ 24
Ilocos Sur	1,160	1,235	— 6	10,430	10,380	.....
Iloilo	2,340	2,550	— 8	17,100	22,320	— 23
Isabela	15,080	17,375	— 13	192,000	201,010	— 5
Laguna	.....	.....	.....	.....	.....	.....
Lanao	340	285	+ 19	2,630	3,210	— 18
La Union	7,980	7,050	+ 13	115,070	108,320	+ 6
Leyte	1,730	2,005	— 14	18,730	18,140	+ 3
Marinduque	80	90	— 11	650	630	+ 3
Masbate	210	180	+ 17	1,780	1,630	+ 9
Mindoro	30	40	— 25	370	400	— 8
Misamis	130	125	+ 4	1,270	1,610	— 21
Mountain Province	1,250	1,405	— 11	7,800	8,970	— 13
Nueva Ecija	1,440	1,190	+ 21	11,160	9,790	+ 14
Nueva Vizcaya	300	170	+ 76	3,580	2,040	+ 75
Occidental Negros	790	1,060	— 26	15,680	19,930	— 21
Oriental Negros	1,480	850	+ 74	16,670	10,860	+ 53
Palawan	60	25	+140	640	360	+ 78
Pampanga	.....	.....	.....	.....	.....	.....
Pangasinan	9,570	8,990	+ 6	129,900	125,610	+ 3
Rizal	30	10	+200	130	50	+160
Romblon	230	275	— 16	1,450	2,160	— 33
Samar	330	500	— 34	2,250	4,080	— 45
Sorsogon	10	10	.....	70	60	+ 17
Sulu	230	35	+557	2,330	370	+530
Surigao	290	340	— 15	3,340	2,840	+ 18
Tarlac	1,240	915	+ 35	11,090	7,540	+ 47
Tayabas	60	30	+100	280	410	— 32
Zambales	130	135	— 4	1,100	1,050	+ 5
Zamboanga	100	75	+ 33	800	530	+ 51
Philippine Islands	71,630	72,090	— 1	910.910	941,800	— 3

1 quintal=46 kilos.

TABLE XV.—*Tobacco—Average yield per hectare, average price and value of production, by provinces, for the years ending June 30, 1924 and 1925*

Provinces	Average yield per hectare		Average price per quintal		Total value		Increase or decrease
	1925	1924	1925	1924	1925	1924	
	Quintals	*Quintals*					*Per cent*
Abra	10	9	₱6.61	₱7.60	₱93,350	₱116,780	— 20
Agusan	9	11	16.69	12.45	58,580	38,720	+ 51
Albay							
Antique	5	5	17.18	10.95	19,070	14,560	+ 31
Bataan							
Batanes	6	5	11.08	9.30	1,330	930	+ 43
Batangas	6	5	17.06	13.43	13,140	8,730	+ 50
Bohol	11	12	12.29	11.28	60,850	64,440	— 6
Bukidnon	11	10	14.05	16.48	18,410	15,660	+ 17
Bulacan	5	4	11.55	8.64	4,160	2,420	+ 72
Cagayan	14	16	13.58	9.70	2,490,290	1,937,400	+ 28
Camarines Norte							
Camarines Sur	3		9.33		280		
Capiz	7	8	17.12	17.62	18,660	23,430	— 20
Cavite	9	14	9.28	14.40	4,920	6,050	— 19
Cebu	18	18	7.98	6.19	667,930	682,000	— 2
Cotabato	12	14	11.27	8.85	23,550	12,300	+ 91
Davao	9	8	15.08	17.88	13,570	15,200	— 11
Ilocos Norte	11	13	6.64	7.94	296,930	254,020	+ 17
Ilocos Sur	9	8	8.35	8.12	87,140	84,250	+ 3
Iloilo	7	9	16.50	18.35	282,210	409,560	— 31
Isabela	13	11	19.37	15.20	3,719,010	3,055,900	+ 22
Laguna							
Lanao	8	11	17.14	20.15	45,070	64,680	— 30
La Union	14	15	10.03	15.88	1,154,490	1,720,210	— 33
Leyte	11	9	24.88	27.33	466,040	495,810	— 6
Marinduque	8	7	8.05	8.00	5,230	5,040	+ 4
Masbate	8	9	11.06	14.12	19,680	23,010	— 15
Mindoro	12	10	17.00	15.62	6,290	6,250	+ 1
Misamis	10	13	24.03	28.32	30,520	45,590	— 33
Mountain Province	6	6	12.45	9.23	97,140	83,060	+ 17
Nueva Ecija	8	8	11.10	13.13	123,910	128,590	— 4
Nueva Vizcaya	12	12	20.36	18.09	72,880	36,910	+ 97
Occidental Negros	20	19	7.54	7.79	118,250	155,360	— 24
Oriental Negros	11	13	8.57	10.51	142,910	114,120	+ 25
Palawan	11	14	11.84	15.00	7,580	5,400	+ 40
Pampanga							
Pangasinan	13	14	10.51	12.24	1,364,790	1,537,800	— 11
Rizal	4	5	15.85	17.60	2,060	880	+134
Romblon	6	8	9.49	12.79	13,760	27,620	— 50
Samar	7	8	23.40	21.31	52,660	86,950	— 40
Sorsogon	7	6	16.00	23.50	1,120	1,410	— 21
Sulu	10	10	10.51	9.49	24,500	3,510	+598
Surigao	11	8	30.66	27.82	102,400	79,000	+ 30
Tarlac	9	8	11.71	13.15	129,890	99,180	+ 31
Tayabas	5	14	23.21	36.19	6,500	14,840	— 56
Zambales	8	8	18.07	19.56	19,880	20,540	— 3
Zamboanga	8	7	13.32	13.79	10,660	7,310	+ 46
Philippine Islands	13	13	13.05	12.22	11,891,590	11,505,420	+ 3

TABLE XVI.—*Maguey—Area cultivated, area productive and production, by provinces, for the years ending June 30, 1924 and 1925*

Provinces	Area cultivated		Increase or decrease	Area productive		Production		Increase or decrease
	1925	1924		1925	1924	1925	1924	
	Hectares	*Hectares*	*Per cent*	*Hectares*	*Hectares*	*Piculs* [1]	*Piculs* [1]	*Per cent*
Abra	20	10	+100	.....	.....	.....	.....	.....
Agusan	.....	.....	.....	.....	.....	.....	.....	.....
Albay	.....	.....	.....	.....	.....	.....	.....	.....
Antique	50	50	.....	40	40	100	40	+150
Bataan	.....	.....	.....	.....	.....	.....	.....	.....
Batanes	.....	.....	.....	.....	.....	.....	.....	.....
Batangas	.....	.....	.....	.....	.....	.....	.....	.....
Bohol	2,740	2,775	— 1	2,390	2,695	32,420	30,330	+ 7
Bukidnon	.....	.....	.....	.....	.....	.....	.....	.....
Bulacan	(2)	(2)	.....	.....	.....	.....	.....	.....
Cagayan	10	10	.....	5	5	10	20	— 50
Camarines Norte	.....	.....	.....	.....	.....	.....	.....	.....
Camarines Sur	.....	.....	.....	.....	.....	.....	.....	.....
Capiz	5	5	.....	.....	.....	.....	.....	.....
Cavite	.....	.....	.....	.....	.....	.....	.....	.....
Cebu	11,655	12,280	— 5	10,140	10,765	261,990	269,945	— 3
Cotabato	.....	.....	.....	.....	.....	.....	.....	.....
Davao	.....	.....	.....	.....	.....	.....	.....	.....
Ilocos Norte	6,520	5,885	+ 11	4,495	5,045	26,200	23,945	+ 9
Ilocos Sur	5,950	5,375	+ 11	5,560	5,010	103,330	97,980	+ 5
Iloilo	15	15	.....	10	.....	(3)	.....	.....
Isabela	.....	.....	.....	.....	.....	.....	.....	.....
Laguna	.....	.....	.....	.....	.....	.....	.....	.....
Lanao	.....	.....	.....	.....	.....	.....	.....	.....
La Union	290	285	+ 2	60	270	70	125	— 44
Leyte	920	895	+ 3	500	505	1,320	900	+ 47
Marinduque	(2)	(2)	.....	.....	.....	.....	.....	.....
Masbate	125	100	+ 25	40	.....	530	.....	.....
Mindoro	.....	.....	.....	.....	.....	.....	.....	.....
Misamis	.....	.....	.....	.....	.....	.....	.....	.....
Mountain Province	15	10	+ 50	10	10	20	50	— 60
Nueva Ecija	10	5	+100	.....	.....	.....	.....	.....
Nueva Vizcaya	.....	.....	.....	.....	.....	.....	.....	.....
Occidental Negros	55	35	+ 57	30	25	710	540	+ 31
Oriental Negros	400	205	+ 95	370	165	11,730	4,995	+135
Palawan	.....	.....	.....	.....	.....	.....	.....	.....
Pampanga	.....	.....	.....	.....	.....	.....	.....	.....
Pangasinan	2,170	1,275	+ 70	1,140	940	16,480	13,105	+ 26
Rizal	10	10	.....	.....	.....	.....	.....	.....
Romblon	.....	.....	.....	.....	.....	.....	.....	.....
Samar	.....	.....	.....	.....	.....	.....	.....	.....
Sorsogon	.....	.....	.....	.....	.....	.....	.....	.....
Sulu	5	10	— 50	.....	10	.....	5	.....
Surigao	.....	.....	.....	.....	.....	.....	.....	.....
Tarlac	5	5	.....	(2)	5	10	25	— 60
Tayabas	.....	.....	.....	.....	.....	.....	.....	.....
Zambales	130	140	— 7	110	130	1,080	1,005	+ 7
Zamboanga	.....	.....	.....	.....	.....	.....	.....	.....
Philippine Islands	31,100	29,380	+ 6	24,900	25,620	456,000	443,010	+ 3

[1] 1 picul=63.25 kilos. [2] Less than 5 hectares. [3] Less than 10 piculs.

TABLE XVII.—*Maguey—Average yield per hectare, average price and value of production, by provinces, for the years ending June 30, 1924 and 1925*

Provinces	Average yield per hectare		Average price per picul in the municipal markets		Total value in the municipal markets		Increase or decrease
	1925	1924	1925	1924	1925	1924	
	Piculs	*Piculs*					*Per cent*
Abra							
Agusan							
Albay							
Anticue	2	1	₱14.00	₱14.75	₱1,400	₱590	+137
Bataan							
Batanes							
Batangas							
Bohol	13	11	12.05	6.91	390,790	209,760	+ 86
Bukidnon							
Bulacan							
Cagayan	2	4	6.00	5.00	60	100	— 40
Camarines Norte							
Camarines Sur							
Capiz							
Cavite							
Cebu	26	25	13.29	8.63	3,483,380	2,329,140	+ 49
Cotabato							
Davao							
Ilocos Norte	6	5	9.99	8.23	261,720	197,090	+ 33
Ilocos Sur	18	19	11.64	7.68	1,202,400	752,130	+ 60
Iloilo			16.00		30		
Isabela							
Laguna							
Lanao							
La Union	1		5.00	4.96	350	620	— 44
Leyte	3	2	11.12	8.02	14,680	7,220	+103
Marinduque							
Masbate	13		7.02		3,720		
Mindoro							
Misamis							
Mountain Province	2	5	6.00	5.40	120	270	— 65
Nueva Ecija							
Nueva Vizcaya							
Occidental Negros	24	22	12.89	6.46	9,150	3,490	+162
Oriental Negros	32	30	11.74	9.11	137,730	45,500	+203
Palawan							
Pampanga							
Pangasinan	14	14	10.27	7.39	169,310	96,810	+ 75
Rizal							
Romblon							
Samar							
Sorsogon							
Sulu				4.00		20	
Surigao							
Tarlac	10	5	12.00	10.80	120	270	— 56
Tayabas							
Zambales	10	8	7.01	6.10	7,570	6,130	+ 23
Zamboanga							
Philippine Islands	18	17	12.46	8.24	5,682,530	3,649,140	+ 56

TABLE XVIII.—*Cacao—Trees cultivated and production by provinces, for the years ending June 30, 1924 and 1925*

Provinces	Trees cultivated		Increase or decrease	Production		Increase or decrease
	1925	1924		1925	1924	
	Number	*Number*	*Per cent*	*Kilos*	*Kilos*	*Per cent*
Abra	1,200	1,200	.....	900	900	.....
Agusan	66,000	87,800	—25	29,700	33,100	— 10
Albay	55,600	54,900	+ 1	33,100	32,500	+ 2
Antique	39,900	39,000	+ 2	12,300	12,000	+ 2
Bataan	8,900	8,800	+ 1	2,000	2,100	— 5
Batanes	.....	.....	.....	.....	.....	.....
Batangas	71,300	70,300	+ 1	22,000	24,800	— 11
Bohol	151,400	146,500	+ 3	56,800	56,600	.....
Bukidnon	87,800	77,800	+13	52,200	34,100	+ 53
Bulacan	7,500	5,500	+36	2,500	4,300	— 42
Cagayan	22,200	20,600	+ 8	6,200	5,600	+ 11
Camarines Norte	15,100	16,000	— 6	12,000	11,000	+ 9
Camarines Sur	72,600	70,200	+ 3	48,500	65,500	— 26
Capiz	12,200	24,200	—50	4,400	6,500	— 32
Cavite	150,000	149,600	.....	100,600	106,700	— 6
Cebu	116,800	109,300	+ 7	130,900	110,900	+ 18
Cotabato	3,400	3,200	+ 6	1,300	1,000	+ 30
Davao	3,900	4,900	—21	2,400	2,500	— 4
Ilocos Norte	18,600	19,300	— 4	4,100	4,000	+ 2
Ilocos Sur	6,800	9,800	—31	3,400	5,400	— 37
Iloilo	92,500	89,300	+ 3	51,400	50,100	+ 2
Isabela	14,800	24,500	—40	6,800	5,300	+ 28
Laguna	23,800	26,600	—11	30,700	35,700	— 14
Lanao	6,000	7,900	—24	2,500	5,900	— 58
La Union	91,800	89,100	+ 3	102,500	97,700	+ 5
Leyte	107,800	107,200	.....	34,300	68,400	— 50
Marinduque	9,600	7,800	+23	3,900	2,300	+ 69
Masbate	1,600	2,500	—36	1,000	1,500	— 67
Mindoro	63,200	56,700	+11	21,000	22,300	— 6
Misamis	29,900	35,300	—15	16,500	19,400	— 15
Mountain Province	19,300	20,400	— 5	9,000	9,100	— 1
Nueva Ecija	12,800	13,100	— 2	13,300	13,700	— 3
Nueva Vizcaya	18,500	12,800	+44	3,100	3,200	— 3
Occidental Negros	53,700	55,200	— 3	45,000	48,600	— 8
Orien al Negros	185,300	164,800	+12	68,900	63,000	+ 9
Palawan	7,400	7,400	.....	6,200	5,700	+ 9
Pampanga	5,600	11,700	—52	5,700	7,100	— 20
Pangasinan	86,500	90,300	— 4	45,500	69,600	— 35
Rizal	9,300	8,200	+13	2,900	3,400	— 15
Romblon	4,900	5,700	—14	1,600	1,600	.....
Samar	70,200	62,800	+12	23,800	28,900	— 18
Sorsogon	17,700	17,200	+ 3	5,400	9,700	— 44
Sulu	500	300	+67	300	.....	+300
Surigao	51,300	39,900	+28	28,100	23,800	+ 18
Tarlac	3,700	4,800	—23	3,100	7,300	— 58
Tayabas	87,600	74,200	+18	46,500	30,100	+ 54
Zambales	5,400	5,900	— 9	2,900	3,600	— 20
Zamboanga	8,400	9,000	— 7	4,700	4,300	+ 9
Philippine Islands	2,000,300	1,969,400	+ 1	1,111,900	1,160,800	— 4

TABLE XIX.—*Cacao—Average yield per tree, average price and value of production, by provinces, for the years ending June 30, 1924 and 1925*

Provinces	Average yield per tree		Average price per kilo in the municipal markets		Total value in the municipal markets		Increase or decrease
	1925	1924	1925	1924	1925	1924	
	Kilos	*Kilos*					*Per cent*
Abra	1.50	1.50	₱1.22	₱1.10	₱1,100	₱1,000	+ 10
Agusan	.84	.82	.90	.80	26,700	27,300	— 2
Albay	1.14	1.15	.69	.70	23,000	22,200	+ 4
Antique	.93	.88	1.35	1.90	16,600	23,400	— 29
Bataan	1.00	1.05	1.35	1.30	2,700	2,800	— 4
Batanes	.....	.....	.....	.....	.....	.....	.....
Batangas	1.00	1.00	1.19	1.10	26,100	28,400	— 8
Bohol	.62	.62	.93	.97	52,700	54,900	— 4
Bukidnon	.89	.90	.46	.47	24,000	16,000	+ 50
Bulacan	1.00	1.95	1.48	.95	3,700	4,100	— 10
Cagayan	1.07	1.02	.74	.86	4,600	4,800	— 4
Camarines Norte	1.12	1.07	.80	.77	9,600	8,500	+ 13
Camarines Sur	1.04	1.14	.99	1.00	48,300	65,500	— 26
Capiz	.73	.93	1.07	.97	4,700	6,300	— 25
Cavite	1.10	1.49	1.33	1.13	133,800	120,600	+ 11
Cebu	1.90	1.83	.96	.93	126,700	103,300	+ 23
Cotabato	1.30	1.11	1.31	1.90	1,700	1,900	— 11
Davao	1.20	1.25	1.00	1.00	2,400	2,500	— 4
Ilocos Norte	.84	1.43	1.00	1.00	4,200	4,000	+ 5
Ilocos Sur	.81	.87	.70	.89	2,400	4,800	— 50
Iloilo	.99	1.06	1.22	1.15	63,000	57,600	+ 9
Isabela	.93	.78	.87	.87	5,900	4,600	+ 28
Laguna	2.74	1.74	1.13	1.21	34,700	43,100	— 20
Lanao	.46	1.02	.92	.95	2,300	5,600	— 59
La Union	1.62	1.58	1.40	1.31	143,500	128,600	+ 11
Leyte	.91	1.07	1.07	1.00	36,700	68,400	— 46
Marinduque	.76	.79	1.00	1.00	3,900	2,300	+ 69
Masbate	1.00	1.00	1.20	1.00	1,200	1,500	— 20
Mindoro	.54	.62	1.18	1.09	24,700	24,400	+ 1
Misamis	1.13	1.39	1.10	.96	18,100	18,600	— 3
Mountain Province	.87	.87	.87	.88	7,800	8,000	— 3
Nueva Ecija	1.82	2.04	1.01	1.01	13,500	13,800	— 2
Nueva Vizcaya	1.08	1.39	1.13	1.09	3,500	3,500	.....
Occidental Negros	1.00	1.09	1.07	.98	48,200	47,400	+ 2
Oriental Negros	.60	.61	.95	.94	65,400	59,100	+ 11
Palawan	1.03	.97	1.14	1.23	7,100	7,000	+ 1
Pampanga	1.39	1.15	1.02	1.24	5,800	8,900	— 35
Pangasinan	.93	1.27	1.39	1.36	63,400	94,500	— 33
Rizal	.59	.81	.90	1.03	2,600	3,500	— 26
Romblon	.64	.64	1.19	1.06	1,900	1,700	+ 12
Samar	.59	1.02	.81	.87	19,400	25,200	— 23
Sorsogon	.57	1.45	1.13	.96	6,100	9,300	— 35
Sulu	1.50	.....	.33	.....	100	.....	+100
Surigao	.87	1.06	.94	.89	26,400	21,100	+ 25
Tarlac	1.19	1.97	.84	.95	2,600	6,900	— 62
Tayabas	.77	.62	1.27	1.03	59,000	30,900	+ 91
Zambales	1.00	1.24	1.07	1.58	3,100	5,700	— 46
Zamboanga	1.42	1.08	.89	.72	4,200	3,100	+ 35
Philippine Islands	.99	1.08	1.07	1.04	1,189,100	1,206,600	— 2

TABLE XX.—*Coffee—trees cultivated and production by provinces, for the years ending June 30, 1924 and 1925*

Provinces	Trees cultivated		Increase or Decrease	Production		Increase or decrease
	1925	1924		1925	1924	
	Number	*Number*	*Per cent*	*Kilos*	*Kilos*	*Per cent*
Abra	12,500	12,100	+ 3	7,300	6,600	+ 10
Agusan	19,400	20,300	— 5	4,000	2,400	+ 66
Albay	10,600	11,900	—11	2,000	1,200	+ 66
Antique	19,800	19,000	+ 4	4,300	4,700	— 9
Bataan	3,500	4,300	—19	900	800	+ 12
Batanes	100	100	.....	.....	.....	.....
Batangas	326,200	307,100	+ 6	185,900	189,000	— 2
Bohol	68,800	65,500	+ 5	14,600	11,800	+ 23
Bukidnon	54,600	65,200	—17	38,100	40,500	— 6
Bulacan	4,400	4,100	+ 7	1,200	1,300	— 8
Cagayan	21,400	18,900	+13	4,500	9,400	— 53
Camarines Norte	.....	100	.....	.....	.....	.....
Camarines Sur	11,500	10,900	+ 5	7,400	5,300	+ 39
Capiz	19,800	20,600	— 4	4,400	3,800	+ 15
Cavite	234,700	214,200	+ 9	217,400	212,800	+ 2
Cebu	23,700	21,200	+11	15,800	14,400	+ 10
Cotabato	1,100	900	+22	700	600	+ 16
Davao	8,100	8,000	+ 1	4,800	4,600	+ 4
Ilocos Norte	41,300	39,500	+ 5	13,200	12,200	+ 8
Ilocos Sur	37,900	38,700	— 2	24,800	25,500	— 3
Iloilo	284,800	264,500	+ 7	105,100	91,900	+ 14
Isabela	12,500	11,000	+13	8,200	7,300	+ 12
Laguna	15,600	15,500	+ 1	4,800	4,700	+ 2
Lanao	50,300	74,900	—33	36,400	46,100	— 21
La Union	81,300	75,800	+ 7	75,600	78,100	— 4
Leyte	10,900	10,900	.....	5,800	6,200	— 7
Marinduque	21,000	17,700	+18	13,500	14,200	— 5
Masbate	200	200	.....	100	100	.....
Mindoro	53,000	49,000	+ 8	18,800	17,600	+ 6
Misamis	6,300	9,400	—33	6,400	5,700	+ 12
Mountain Province	431,700	422,000	+ 2	120,400	115,000	+ 4
Nueva Ecija	25,700	26,000	— 2	13,700	14,900	— 8
Nueva Viscaya	26,800	21,800	+23	6,000	5,500	+ 9
Occidental Negros	12,700	8,900	+43	5,900	4,700	+ 25
Oriental Negros	170,000	168,400	+ 1	130,100	143,500	— 9
Palawan	7,200	7,200	.....	4,400	4,200	+ 4
Pampanga	400	400	.....	300	300	.....
Pangasinan	111,700	104,900	+ 6	44,800	42,000	+ 6
Rizal	5,300	5,100	+ 4	1,700	1,900	— 11
Romblon	1,900	1,800	+ 5	500	400	+ 25
Samar	9,500	10,600	—11	2,400	3,000	— 20
Sorsogon	9,900	8,100	+22	3,400	3,000	+ 13
Sulu	900	800	+12	700	500	+ 40
Surigao	3,400	3,300	+ 3	1,000	800	+ 25
Tarlac	6,300	5,600	+12	2,200	2,000	+ 10
Tayabas	25,700	24,200	+ 6	5,700	4,500	+ 26
Zambales	7,000	6,800	+ 3	1,600	1,700	+ 6
Zamboanga	24,200	22,000	+10	7,400	6,900	— 6
Philippine Islands	2,335,600	2,259,400	+ 3	1,178,200	1,173,600	.....

TABLE XXI.—*Coffee—Average yield per tree, average prices and total value by provinces, for the years ending June 30, 1924 and 1925*

Provinces	Average yield per hectare		Average price per kilo		Total value in the municipal markets		Increase or decrease
	1925	1924	1925	1924	1925	1924	
	Kilos	*Kilos*					*Per cent*
Abra	1.28	1.08	₱.42	₱.41	₱3,100	₱2,900	+ 7
Agusan	.38	.22	.50	.62	2,000	1,500	+ 33
Albay	.48	.31	.95	.75	1,900	900	+111
Antique	.48	.55	1.21	1.02	5,200	4,800	+ 8
Bataan	.64	.57	1.00	1.00	900	800	+ 12
Batanes	.....	.....	.....	.....	.....	.....	.....
Batangas	.94	1.30	.43	.45	80,500	84,500	— 5
Bohol	.42	.35	.76	.80	11,100	9,400	+ 19
Bukidnon	1.10	1.13	.52	.39	19,700	15,800	+ 24
Bulacan	.70	.72	1.17	1.23	1,400	1,600	— 13
Cagayan	.68	1.22	1.09	.71	4,900	6,700	— 27
Camarines Norte	.....	.....	.....	.....	.....	.....	.....
Camarines Sur	1.72	.77	.66	.77	4,900	4,100	+ 19
Capiz	.81	.69	.64	.68	2,800	2,500	+ 12
Cavite	1.47	1.57	.89	.88	193,500	187,300	+ 3
Cebu	.95	.87	.68	.62	10,700	9,000	+ 18
Cotabato	1.17	1.00	.57	.67	400	400	.....
Davao	1.00	.98	.98	1.00	4,700	4,600	+ 2
Ilocos Norte	.70	.68	.95	1.01	12,500	12,300	+ 2
Ilocos Sur	.95	1.02	.92	.87	22,900	22,100	+ 3
Iloilo	.90	.85	.76	.77	79,900	70,900	+ 12
Isabela	1.14	1.30	.88	.67	7,200	4,900	+ 47
Laguna	.60	.61	1.00	1.02	4,800	4,800	.....
Lanao	.90	.74	.67	.65	24,300	30,000	— 19
La Union	1.15	1.28	.97	.97	73,100	75,700	— 4
Leyte	.93	1.03	.86	.76	5,000	4,700	+ 6
Marinduque	.99	1.01	.49	.42	6,600	6,000	+ 10
Masbate	.50	.50	1.00	1.00	100	100	.....
Mindoro	.62	.66	.84	.83	15,800	14,600	+ 8
Misamis	1.42	1.00	1.01	1.09	6,500	6,200	+ 4
Mountain Province	.45	.48	.51	.55	61,400	63,000	— 1
Nueva Ecija	.77	.73	.69	.64	9,500	9,600	— 3
Nueva Vizcaya	.62	.68	.78	.78	4,700	4,300	+ 9
Occidental Negros	.88	.81	.71	.72	4,200	3,400	+ 23
Oriental Negros	2.02	2.04	.72	.60	93,700	86,100	+ 8
Palawan	1.10	1.14	.98	1.00	4,300	4,200	+ 2
Pampanga	1.50	1.50	1.33	1.33	400	400	.....
Pangasinan	.66	.64	.67	.64	30,200	26,800	+ 12
Rizal	.89	.73	1.23	.95	2,100	1,800	+ 16
Romblon	.62	.50	1.00	1.00	500	400	+ 25
Samar	.86	.97	1.17	1.30	2,800	3,900	— 28
Sorsogon	.97	.86	1.06	.83	3,600	2,500	+ 44
Sulu	1.17	1.25	.57	.40	400	200	+100
Surigao	1.00	.89	1.00	1.00	1,000	800	+ 25
Tarlac	.56	.53	.68	.65	1,500	1,300	+ 15
Tayabas	.56	.47	.63	.69	3,600	3,100	+ 16
Zambales	.41	.57	.81	.82	1,300	1,400	— 7
Zamboanga	1.17	1.03	.63	.67	4,700	4,600	+ 2
Philippine Islands	.91	.98	.71	.69	836,300	806,900	+ 3

VARIETY TEST OF SUGAR CANE AT LA CARLOTA SUGAR-CANE EXPERIMENT STATION, LA CARLOTA, OCCIDENTAL NEGROS, FOR THE CROP YEAR 1925–1926

By

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and

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Experience has shown in Hawaii that cane varieties have to be changed from time to time. Several years ago the Lahaina variety predominated there but now Hawaii–109 is fast replacing Lahaina. It is claimed that Hawaii–109 is very resistant to the Lahaina disease prevailing in many localities in Hawaii. Sugar planters in the Philippines may benefit by the experience of the sugar planters of Hawaii. The two most common native varieties, Luzon White and Negros Purple, have been found by some planters to be fast degenerating in certain districts. It is the aim of this paper to point out to the planters that some of the imported varieties are better yielders than the native varieties, both in tonnage and in piculs of sugar.

MATERIALS AND METHODS

The experiment is a continuation of the variety test of last year. A rectangular field containing 30,000 square meters was measured off and the ground broken with disc plows and subsequently gone over with Vargas and Luzon plows. Triangle harrows were used after each plowing. Before planting it was divided into 30 equal plots of 1,000 square meters each. Cultivation was done entirely with plows. The young canes were first off-barred, and the ground then hoed and weeded. After two or three weeks the field was cultivated again but this time the soil was thrown up about the canes so that the small weeds left by the hoeing gang were covered up by the plow. This operation was repeated several times until the field was thoroughly clean. The last cultivating was done when the canes were tall. At this time all the available dirt was shoveled up against the plants.

EXPERIMENTS AND RESULTS

Fifteen varieties, including Negros Purple, which was used in the check plot, were grown for the tests. Each variety occupied

8 rows 100 meters long with a distance of 1.20 meters between the rows. The space between the rows was also 1.20 meters. The field was planted between November 14 and December 31, 1924. Harvesting was begun on January 4, 1926, when the canes were 13 months and 6 days old. The following table shows the results:

Variety name	Fiber in cane	Brix	Polarization C. J.	App. purity C. J.	Sugar in cane	Piculs per ton of cane	Yield per hectare	
							Tons of cane	Piculs of sugar
			Per cent		*Per cent*			
1. Negros Purple	11.0	15.5	13.0	83.4	9.53	1.51	75.84	113.45
2. Barbados 147	8.4	16.8	14.4	85.7	10 63	1.68	90.80	149.99
3. Badila	9.1	17.7	15.7	88.7	11 78	1.86	72.04	134 19
4. Hambledon 428	9.8	17.4	15.1	86.8	11.22	1.76	67.03	116.89
5. Big Tanna	14.6	13.4	9.4	70.1	6.15	.97	80.34	77.82
6. Luzon White	12.5	15.4	12.6	81.7	9.07	1.43	67.93	97.15
7. Hawaii-109	14.6	16.2	13.4	83.0	9.77	1.54	110.44	170 85
8. Rose Bamboo	10.0	14.8	12.2	82.8	8.40	1.32	89 68	117.95
9. New Guinea 24-A	12.0	16.9	13.7	81.0	9.32	1.47	102.67	151.18
10. Luzon Purple	11.3	16.4	13.7	83.9	9.96	1.57	74.22	116.95
11. Goru or New Guinea 24	8.2	16.3	13.5	82.7	9.72	1.53	74.94	115.12
12. Java 247	12.8	15.5	12.6	80.8	9.00	1.42	105.78	150 27
13. Louisiana Striped	10.5	14.8	11.4	77 8	8.00	1.26	80.86	101 75
14. New Guinea 24-B	9.9	15.2	12.3	80.9	8.79	1.38	63 60	87 85
15. Yellow Caledonia	15.5	17.0	13.9	81.8	9.99	1.57	75.40	118.70

From this above table it may be noted that 10 varieties gave bigger yields in sugar than the check plot. In the order of their yields these were Hawaii–109 with 170.65 piculs of sugar; New Guinea 24–A, 151.18; Java 247, 150.27; Barbados, 149.99; Badila, 134.19; Yellow Caledonia, 118.70; Rose Bamboo, 117.95; Luzon Purple, 116.95; Hambledon 426, 116.89; and Goru or New Guinea 24, 115.12. In tonnage, however, the order of the yield was Hawaii–109 with 110.44 tons of cane; Java 247, 105.78; New Guinea 24–A, 102.67; Barbados, 90.80; Rose Bamboo, 89.68; Louisiana Striped, 80.86; and Big Tanna, 80.34. Hawaii–109 is the best yielder giving 110.44 tons of cane or 170.65 piculs of sugar per hectare. New Guinea 24–A came out second with 151.18 piculs of sugar per hectare. In tonnage, Java 247 is second with 105.78 tons of cane per hectare but due to the difference of sucrose content it gave only 150.27 piculs of sugar per hectare. With this yield Java 247 came out third. Barbados took fourth place with 149.99 piculs of sugar per hectare and Badila fifth, with only 72.04 tons of cane per hectare which is less than Negros Purple (75.04 tons) but as it gave the highest per cent sucrose, 15.7 and purity of 88.7, the number of piculs turned out was 134.19 per hectare against 113.45 piculs of Negros Purple.

FERTILIZER TEST OF SUGAR-CANE IN LA CARLOTA SUGAR-CANE EXPERIMENT STATION FOR THE CROP YEAR 1924–1925

By

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This experiment is a continuation of the fertilizer test in La Carlota Sugar-Cane Experiment Station, La Carlota, Occidental Negros, the purpose of which is to determine what kinds of fertilizers in different combinations are best calculated to produce the highest yield in tonnage of sugar cane and in piculs of sugar per hectare there.

A rectangular field of 2.34 hectares was laid off for this experiment and thoroughly prepared. As soon as it was ready for planting it was divided into 22 equal plots of 1,000 square meters each with a space of 1.5 meters wide left between the plots. On November 15, 1923, points of Negros Purple were planted with a distance between the rows of 1 meter and 40 centimeters between the hills. Similar and proper cultural treatments were given throughout.

The fertilizers were applied on April 28, 1924, when the canes were 5 months and 13 days old, in the following manner:

Plot	Fertilizers	Fertilizing values in kilos per hectare			Rate per hectare in kilos
		N	P205	K20	
1–A	Control				
2–A	Ammonium sulphate	40			200
3–A	Acid phosphate		264		1,200
4–A	Sulphate of potash			30	150
5–A	Lime shell				1,000
6–A	Ammonium sulphate	40			200
	Acid phosphate		264		1,200
7–A	Ammonium sulphate	40			200
	Sulphate of potash			30	150
8–A	Acid phosphate		264		1,200
	Sulphate of potash			30	150
9–A	Ammonium sulphate	40			200
	Acid phosphate		264		1,200
	Sulphate of potash			30	150
10–A	Nitrate of soda	25			200
	Lime shell				1,000
1–B to 10–B	Same as 1–A to 10–A, respectively.				
1	Control				
11	Copra cake				500

It was intended to fertilize plots 1–A and 10–B with ammonium sulphate, acid phosphate, sulphate of potash and lime shell, but on account of the shortage of phosphate at the time only nitrate of soda and lime shell were applied.

Copra cake was used in only one plot because there were only 50 kilos of the material on hand.

The method of application was similar to that adopted by the neighboring haciendas, that is, a shallow hole was bored in the middle of the cane stools with a pointed stick and then a portion of the fertilizer was put in and covered with earth. All of the fertilizers were applied in this way except the lime shell which was broadcasted over the space between the rows of the cane.

The soil of the experiment field was sandy loam and sloped slightly toward the north.

RESULTS

From February 12 to 27, 1925, the canes were harvested, being then a year and nearly three months old. Proper care was taken that the canes cut from every plot were loaded in separate cars of La Carlota Sugar Central so that separate weights and analyses were obtained. The following table showed the results obtained from each plot.

TABLE 1.

Plot No.	Fiber cane	Analysis of crusher juice			Tonnage yield		Sugar yield in piculs per	
		Brix	Polarization	Apparent purity	Per plot	Per hectare	Ton cane	Hectare
	Per cent		*Per cent*					
1-A	9.6	17.0	14.8	87.0	8.171	81.71	1.77	144.62
2-A	10.0	15.9	12.9	81.1	9.626	86.26	1.48	142.46
3-A	12.9	16.8	12.7	75.6	9.075	90.75	1.39	126.14
4-A	12.8	17.2	13.4	77.9	7.756	77.56	1.50	116.34
5-A	9.7	18.8	15.0	79.8	7.584	75.84	1.71	129.68
6-A	11.6	18.1	15.8	87.3	8.129	81.29	1.90	154.45
7-A	10.4	18.0	16.0	88.9	9.500	95.00	1.96	186.20
8-A	11.6	18.4	15.5	84.2	10.157	101.57	1.82	184.85
9-A	11.9	14.6	12.1	82.9	10.334	103.34	1.40	144.67
10-A	10.5	18.2	16.1	88.5	7.964	79.64	1.95	155.29
1-B	9.8	16.2	12.3	75.9	8.097	80.97	1.34	108.49
2-B	11.6	17.5	14.9	85.1	8.500	85.00	1.75	148.75
3-B	12.9	17.5	14.6	83.4	7.392	73.92	1.71	126.40
4-B	10.7	18.5	14.5	78.4	7.282	72.82	1.63	118.69
5-B	12.6	16.8	12.4	78.5	8.425	84.25	1.37	115.42
6-B	12.2	16.2	13.2	81.5	9.244	92.44	1.51	139.58
7-B	11.9	16.0	13.0	81.2	7.624	76.24	1.48	112.83
8-B	11.3	16.8	14.8	88.1	7.245	72.45	1.78	128.96
9-B	11.2	17.2	14.9	86.6	8.034	80.34	1.78	143.00
10-B	11.9	16.4	14.0	85.3	7.775	77.75	1.66	129.06
1	11.3	17.9	15.7	87.7	7.898	78.98	1.88	148.48
11	9.7	18.7	16.7	89.3	7.179	71.79	2.04	146.45

TABLE 2.—*Average yield per hectare of the different treatments*

Plot No.	Treatment	Tons of cane per hectare	Increase (+) or decrease (—) due to fertilizer	Piculs of sugar per hectare	Increase (+) or decrease (—) due to fertilizer
			Per cent		*Per cent*
1	Check or control	81.34	.....	126.55	.....
2	Ammonium sulphate	90.63	+11.42	145.60	+15.05
3	Acid phosphate	82.33	+ 1.21	126.27	— .22
4	Sulphate of potash	75.19	— 7.55	117.51	— 7.14
5	Lime shell	80.04	— 1.59	122.55	— 3.16
6	Am. sulphate + acid phosphate	86.86	+ 6.78	147.01	+16.16
7	Am. sulphate + sulphate of potash	85.62	+ 5.26	149.51	+18.14
8	Acid phosphate + sulphate of potash	87.01	+ 6.97	106.90	—15.51
9	Am. sulphate + acid phosphate + sulphate of potash	91.84	+12.90	143.83	+13.65
10	Nitrate of soda + lime shell	78.69	— 3.25	142.17	+12.34
11	Copra cake	73.93	— 9.10	124.81	— 1.37

The figures in Table 1 were furnished by La Carlota Sugar Central in the order of the plots. It may be observed that the yield of the three check plots, Nos. 1–A, 1–B, and 1, were slightly variable; and that the middle plot, 1–B, gave a lower yield in sugar than the two ends, but that the yield of cane was higher than from the check plot 1.

In Table 2 the average yield is given together with the percentages of increase or decrease in tons of cane and in piculs of sugar due to the effect of the fertilizers used.

TABLE 3.—*Estimate of expenses per hectare*

Plot No.	Preparation of the ground planting to last cultivation	Cost of the fertilizer used	Cost of mixing fertilizer and application	Cost of harvesting the cane, hauling and loading	Total expenses per hectare
1	₱103.87	.....	.....	₱177.21	₱281.08
2	103.87	₱34.60	₱6.33	199.39	344.19
3	103.87	85.20	6.33	181.13	376.53
4	103.87	22.05	6.33	165.42	297.67
5	103.87	1.28	6.33	176.09	286.77
6	103.87	119.80	6.33	191.09	421.09
7	103.87	56.65	6.33	187.36	354.21
8	103.87	107.25	6.33	191.42	408.87
9	103.87	141.85	6.33	202.05	454.08
10	103.87	33.68	6.33	173.12	317.00
11	103.87	34.00	6.33	157.94	302.14

In estimating the expenses for the preparation of the ground up to the last cultivation, the cost for animal labor was not included as the animals belong to the station; but for harvesting, hauling and loading the cane the cost of both animal labor and carts was included, amounting to ₱2.20 per ton cane.

TABLE 4.—*Income or loss per hectare*

Plot No.	Treatment	55 per cent farmer's share after deducting 45 per cent Central's share	Value of farmer's share at ₱11 per picul	Total expenses per hectare	Gain per hectare	Difference in gain between fertilizer
		Piculs				
1	Control or check	69.60	₱765.60	₱281.08	₱484.52	.....
2	Ammonium sulphate	80.08	880.88	344.19	536.69	+ ₱52.17
3	Acid phosphate	69.45	763.95	376.53	387.42	— 097.10
4	Sulphate potash	64.63	710.93	297.67	413.26	— 71.26
5	Lime shell	67.40	741.40	286.77	454.63	— 29.89
6	Am. sulphate + acid phosphate	80.85	889.46	421.09	468.37	— 16.15
7	Am. sulphate + sulphate of potash	82.23	904.53	354.21	550.32	+ 65.80
8	Acid phosphate + sulphate of potash	58.80	646.80	408.87	237.93	— 246.59
9	Am. sulphate + acid phosphate + sulphate of potash	79.11	870.21	454.08	416.13	— 68.39
10	Nitrate of soda + lime shell	78.19	860.09	317.00	543.09	+ 58.57
11	Copra cake	68.65	755.15	302.14	453.01	— 31.51

SUMMARY OF CONCLUSION

1. A mixture of nitrogen, phosphoric acid, and potash at our present rate of application gave the highest yield of cane per hectare, amounting to 12.9 per cent. The single application of nitrogent showed an increase of 11.4 per cent.

2. In piculs of sugar the mixture of nitrogen and potash gave the highest increase (18.14%) while a mixture of nitrogen and phosphoric acid showed an increase of 16.16 per cent and the single application of nitrogen gave an increase of 15.05 per cent over the check plot.

3. A single application of the other fertilizers with the exception of nitrogen did not increase the production per hectare in this experiment.

4. Nitrogen whenever applied gave an increase in production showing that it is an essential fertilizer for our soil in the station.

5. The highest income in term of pesos was obtained by plot 7 fertilized with a combination of nitrogen and potash, with plot 10 fertilized with nitrogen of soda and lime shell next. A single application of nitrogen in the form of ammonium sulphate gave the third highest yield.

HONEY BEES AND HOW TO RAISE THEM [1]

By FAUSTINO Q. OTANES
Entomologist

There has been, so far, no popular treatise published in the Philippines on honey bees and how to raise them, and though there have been many books and pamphlets issued on this subject in other countries, these are not accessible to most people in the Islands. So this paper has been prepared to supply information to those interested.

THE VALUE OF HONEY BEES

Honey bees have an important place in human economy in that:

(1) They yield honey and wax, the manifold uses of which have been known from time immemorial.

(2) In their visits from flower to flower to gather both nectar and pollen, they incidentally perform the act of pollination. Certain plants will not produce fruits or seeds without being fertilized by insects and honey bees are known to be among the most important of these. Honey bees are especially valuable in fruit growing and orchardists in other countries often keep bees in their orchards chiefly for their services in pollinating the flowers.

HOW BEES MAKE HONEY

The nectar secreted by flowers, if not collected, soon dries up. It is only through the agency of honey bees that this natural product may be gathered. The honey bee workers suck the fluid from the flowers and while in their stomachs, or honey sacks, it undergoes a slight chemical change through the action of enzymes. The nectar in its changed form is then expelled and deposited by the insects on their return home in the cells of their combs, where it is "ripened," that is thickened by the evaporation of a part of its moisture content by the heat emanating from their bodies and by the current of air produced by the fanning of their wings. The resulting product is honey, a most

[1] Bureau of Agriculture Circular No. 199.

toothsome food, (that the word honey has become a common word of endearment in many English-speaking countries is a tribute to its deliciousness) and what is not immediately used the bees conserve by sealing or capping the cells of their combs. This surplus honey, if not collected by man, is used later by the bees in times or shortage, as during droughts, or in the winter, in temperate lands, or when they swarm or send off a swarm to start a new colony. And besides using it for food the bees utilize it for making wax for building their combs. It is estimated that certain honey bees use up 7 to 15 pounds of honey to make a pound of wax.

USES OF HONEY AND WAX

Honey is not only eaten by itself or spread on various foods but is used to flavor many sweetmeats and beverages. It also has both a conservative and a therapeutic value and is used in various arts and industries.

It is most valuable and is especially recommended as a food for children. It is better than ordinary sugar as it is already in the form of glucose, and can be readily assimilated by the system with little or no work by the organs. The eating of honey is thus believed to be conducive to long life and testimonials in this regard are not lacking.

As to wax, its use in primitive loom weaving, in sewing—particularly leather—and for making candles is well known. It is used quite extensively in the preparation of varnishes, polishes, lithographic inks, and water-proofing materials, etc. Artists make wax models of all kinds, such as of flowers, fruits, and other objects. Generations of little girls have adored their wax dolls. In agriculture it is used for making tape for budding and grafting plants. And beekeepers themselves make use of wax in the form of comb foundations, (see definition under tools and equipment) which use has greatly increased the production of honey.

BEEKEEPING AS A HOBBY, AS AN OCCUPATION, AND AS AN INDUSTRY

As a hobby and an occupation beekeeping is not new. It was a favorite diversion and occupation, so history tells us, in ancient Rome, Greece, and Egypt. It is said that the old Egyptians even had floating apiaries.

Up to about sixty years ago beekeeping was carried on in a primitive way and is still in some places in certain countries. The bee were simply kept in hives or boxes, baskets, mud, hol-

lowed logs, and the honey was collected either by driving the bees away or even killing the colony entirely. This was of course wasteful and reduced the future supply. Moreover the honey that was obtained by this method was inferior, as it was often mixed with pollen and brood.

But like other occupations beekeeping did not escape the inventive genius of man, for about sixty years ago the so-called movable-frame hive was invented in America by Reverend L. L. Langstroth, the father of American beekeeping. This hive, which is explained in some detail elsewhere, as its name suggests, holds frames on which the combs, the wax processes of the bees, are built or supported and these frames with the combs and bees can all be lifted out, replaced, interchanged, and transported, etc., with a minimum of disturbance and injury to the bees. The honey can also be gathered more easily by using these combs and is free from pollen and brood and other undesirable substances that detract from its quality. With the invention of the movable or the new modern hive commercial beekeeping really began. It made it possible for one man to take care of a large number of colonies with much less work and expense. It also fostered the scientific study of bees, the results of which contributed materially to the growth of the industry in many countries, as those of Europe and in America. In the United States, as the writer has himself seen, commercial firms with big capital are engaged in beekeeping and in the manufacture of appliances and supplies for beekeepers. To give some idea of the extent of the industry in that country it need only be said that the value of the annual yield of honey is estimated by Dr. E. F. Phillipps, formerly in charge of agriculture in the Bureau of Entomology, United States Department of Agriculture, (now professor at Cornell University) to be about $100,000,000. And as before said, bees perform a far more valuable service as pollinizers; they are worth more than that to American agriculture. So it is easy to understand why research and extension work is carried on indefatigably by the Federal Government, through the United States Department of Agriculture; and by state institutions, especially the agricultural colleges and experiment stations and by private firms and individuals; and why in a large number of universities and colleges courses in beekeeping are given. In some of these, like the Iowa State College, a complete undergraduate curriculum in beekeeping or apiculture, leading to the degree of Bachelor of Science, is offered. Graduate bee courses, upon the completion of which the degree of master of science or

doctor of philosophy is granted, are likewise offered in that as well as other institutions. In many elementary and high schools, too, bees are used as material in connection with nature studies. It is also of interest to mention that in a number of States there are beekeepers' associations. They hold meetings either once or several times a year and publish their proceedings. The most important bee firms publish journals which have a wide circulation. Some of these have been existence for about half a century.

Beekeeping is an occupation which requires no great amount of strength. In other countries, as in the United States, it is pursued by thousands of men, women, and boys and girls alike, either for pin money, or as their sole means of gaining a livelihood. It is not uncommon to see beehives in cities in the United States even on the roofs of houses. Not a few families in that country derive from it fair to good incomes. Beekeeping is both a healthy and pleasurable occupation. Healthy because most of the work is done in the open air, and pleasurable, because the life of the bees is full of interest. There is pleasure in watching the bees provide for and take care of their household, for they go about it as of possessed of a high degree of intelligence.

As a hobby, it is pursued in other countries by people in all walks of life, among them doctors, lawyers, editors, businessmen, ministers, teachers, and artists. They find in it, to say nothing of the returns they derive for what little time and care they give to the bees, a healthy and wholesome change from the routine duties of their respective professions.

An added advantage lies in the relatively small expense involved. The nectar, which the bees get from the flowers, costs the beekeeper nothing and the beekeeper is also rendering a great service to the community and helping his own farm, if he has one, since, as has been said, the bees pollinate the flowers and thereby increase the production of seeds and fruits. Most of what little outlay there is goes for the purchase of equipment and supplies, such as hives and a few tools; and some of these the beekeeper can make himself.

RACES OR KINDS OF BEES

A considerable number of races of bees are raised. In Asia, as in India, a small species of bees, *Apis indica* (which is also common in the Philippines; the writer is not certain whether

the variety here is identical with that in India), is kept in hives. In China and Japan varieties of this species are also raised.

The most important species of bees, varieties of which furnish most of the honey and wax of commerce and the industries, is *Apis mellifica*. This includes the Caucasian, Carniolan, German, and Italian, the last named being the favorite with most beekeepers, especially in the United States, where there is a strong attempt to keep this strain as pure as possible. The Italian bee is gray and golden yellow in color, the latter color predominating in the queen. This bee is not aggressive, is a good honey gatherer, and is not much given to swarming, which are among the most important qualities for profitable beekeeping.

The Carniolan comes next to the Italian in popularity in some parts of the States. This is a dark bee and about the same size as the Italian.

LIFE HISTORY OF BEES

To make a success of beekeeping one must know about the life history and habits of bees. This fact cannot be too strongly emphasized.

Honey bees are social insects, that is, they live together in groups or colonies, colony life being essential to the perpetuity of the race. No individual bee could exist long by itself. It would soon perish. A colony of honey bees is made of workers, a queen, and males or drones. All of these go through three stages of development: the egg, the larva, and the pupa.

The following descriptions refer to the Italian bee:

The milky white ellipsoidal eggs, about 1/16 inch or a little over a millimeter long, are laid by the queen in the bottom of the comb cells. They hatch into footless grubs or larvæ that are also white, and these when mature go into a quiescent stage and are called pupæ, which are white at first and resemble the adult bees. The worker bees seal or cap the comb cells when the larvæ are ready to pupate. The time required for the development of each of the sexes is given in the following table by Dr. E. F. Phillipps. (Beekeeping, Macmillan Co., 1919, p. 103.)

Stage	Queen	Worker	Drone or male
	Days	*Days*	*Days*
Egg	3	3	3
Larva	5½	6	6½
Pupa	7½	12	14½
Total	16	21	24

The preceding figures represent the average in the United States. In the Philippines, the figures vary somewhat principally because of climate. The following general observations on the life-cycle of the Italian bee workers were made by the writer at the Singalong Experiment Station, Manila, in July, 1925.

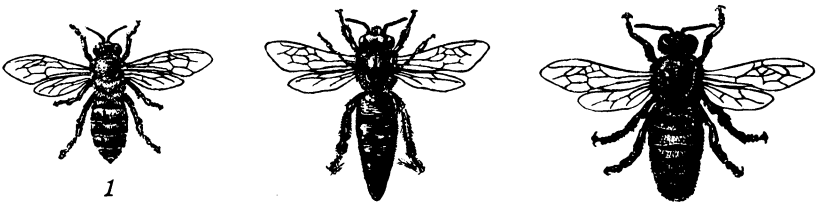
July 9—Eggs laid in worker cells.
July 11—Hatched.
July 17—Cells capped or sealed.
July 21—Pupation.
July 28—Worker bees emerged.

The preceding records give 19 days for the development of worker bees at Singalong, Manila, for that particular month, July, 1925.

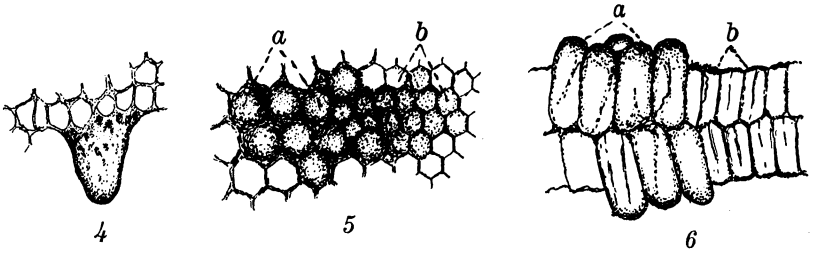
Records taken in March, 1926, give the same total number of days, so that it may be roughly stated that there is little variation in the time required for the development of the worker bees.

The workers.—The workers are undeveloped females and are about one-half inch long. They gather the nectar from flowers and convert it into honey, sometimes going as far as five miles for this, without apparently losing their way; they build the comb, feed and take care of the young, protect the colony, clean the household, as well as to keep it warm, and, in short, do all the work of the colony. The workers possess a functioning stinging apparatus largely for defensive purposes. The number in a colony depends mainly upon the season. In temperate lands, as in the United States, according to Doctor Phillipps, the smallest number may be found at the close of the winter season, when it may be reduced to 10,000; and according to the same authority, it reaches 70,000 during the height of the honey season, that is, in summer. The average number of workers in a colony of Italian bees is usually estimated at about 30,000 by most authorities.

The queen.—The queen is the mother of the colony—not the ruler as was formerly supposed. She lays all the eggs and this is her only function. The burden of nursing the young is borne by the workers. A good queen is capable of laying several thousand eggs a day—between 3,000 and 5,000. The queen is conspicuously larger than the workers, being about three-fourth of an inch long, and can be easily recognized. There is only one queen in a colony of bees except when they are preparing to swarm, at which time there may be two. If the queen dies or is lost the workers will rear a new queen, provided there



(*a*) Individuals in a colony of Italian bees: (1) worker, (2) queen, and (3) male or drone. Size reduced. (Original)



(*b*) Cells in which the individual bees are reared: (4) queen cell, (5) drone (*a*) and worker cells (*b*), and (6) cross section of samem. About half of natural size. (Original)

is brood in the hive. If there is none the colony is doomed to die. The life of the colony being dependent on that of the queen, she is ceaselessly guarded by the workers; for although some of the workers may lay eggs, the bees that will develop from them will all be drones.

The males or drones.—The males are about the size of the queen, but thicker-bodied. Their eyes meet in the middle of their faces, which is not true in the case of the queen and workers. They are the lazy individuals in the colony. They eat honey but they do no work. Hence the name drones, a word which is often used to apply to lazy persons. Their only function, and only one drone is needed for this purpose, is to mate with a virgin queen. After the nuptial flight the worker bees either carry them or drive them all out of the hive to perish. So for most of the time there are no drones in a colony. When the queen either falls off in her egg-laying because she is getting old or has been injured, or because the colony is preparing to send off a swarm (swarming is a natural phenomenon for the increase of the species; other insects such as ants and tèrmites, or white ants swarm also), drones appear, that is to say, are produced by the queen and the workers. The workers know by instinct when the queen is failing. So, too, they know it is time to send off a swarm. In either case they soon rear a new queen and meanwhile they tolerate the drones in the hive. After one of these has succeeded in mating with the virgin queen the workers begin to get rid of the rest of the drones. When there are many colonies in an apiary or when a locality is fairly well stocked with bees the drones may enter other hives, especially when there happens to be a young queen, and the worker bees in those hives will under such circumstances tolerate the invasion.

HOW THE BEES REAR A NEW QUEEN

To get them a new queen the workers select from among the young brood one larva or several larvæ and feed it or them with special food known to beekeepers as "royal jelly"—a white substance resembling library paste. The bees provide these larvæ with abundant space by nibbling the wall separating the cells in which the larvæ are from the adjacent cells, and gradually build up the cells as the larvæ grow until they are full grown, or about so, when they seal or cap the cells. Finished queen cells resemble peanut pods and are easily recognized.

The first young queen that emerges is the lucky one, for on her appearance the remaining queen cells are promptly de-

stroyed by the workers. This is for the welfare of the colony, since when another queen appears the two queens may engage in a fight and one or both may be killed or the victor may be so injured as to be unable to lay eggs.

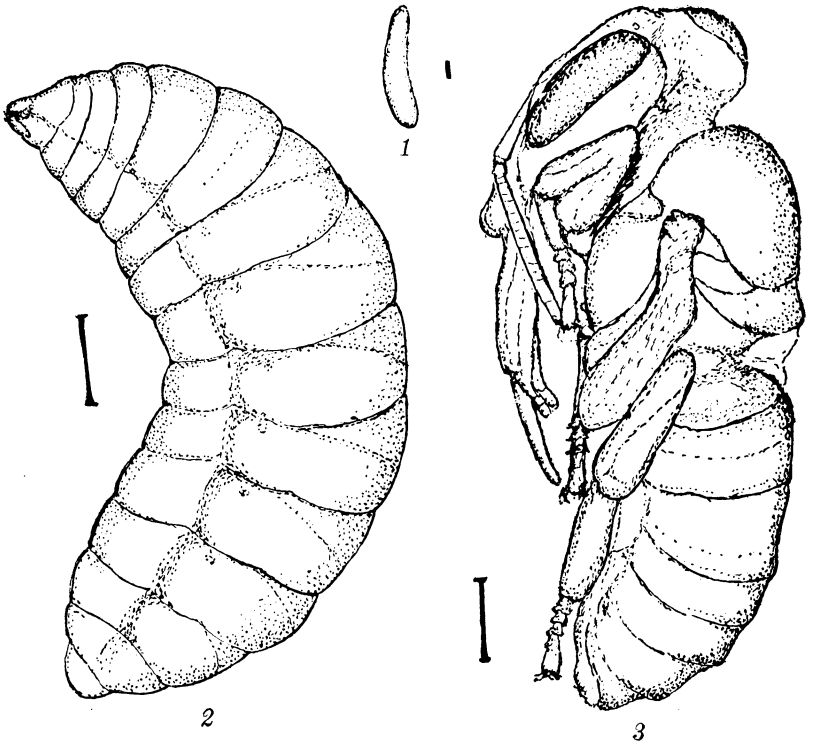
ARTIFICIAL AND COMMERCIAL QUEEN REARING

Knowing how the bees rear a new queen, beekeepers have developed several methods of queen-rearing, named as a rule, after the men who discovered them. Among these are the Hopkins and Doolittle methods. The latter method is the more widely used. These are usually described in bee books, but readers are especially referred to Pellett's Practical Queen Rearing given in the list at the end of the article. The importance of knowing how to rear queens cannot be too strongly emphasized, as the success of producing strong and profitable colonies depends chiefly on this knowledge.

In other countries the big demand for good queens makes it possible for a considerable number of beekeepers to pursue it as a business. In the United States queens are sold at an average price of about two or three dollars, or four or six pesos each. High egg-laying capacity in the queen and efficiency in the workers in storing honey, and gentleness are among the qualities desired, and commercial queen producers aim to develop these.

THE NUPTIAL FLIGHT

Mating takes place in the air. After a few days, when she is strong enough, the young or virgin queen flies out of the hive. Her early flights are short, her apparent purpose being to familiarize herself with her hive and its surroundings. This is vital in the life of the young queen since if she makes a mistake by entering another hive, in case there are a number of colonies, she is sure to be killed by the inmates of that hive, unless she succeeds in making a prompt exit. As the days pass and she gets stronger and thoroughly familiar with her home and surroundings she flies away farther and farther, and may be on the wing as long as half an hour to one hour. Before she is fertilized she is only slightly larger than the average worker and is very active. Mating flights usually occur in the afternoon. Every time the virgin queen flies out of the hive she is pursued by drones, and the workers reveal much anxiety as to her safety. When a drone or male succeeds in coupling with her in the air, the pair falls to the ground and not long after the organs of the male are torn from him and he soon dies. The act is thus



Immature stages of the Italian honey bee worker: (1) egg, (2) larva, and (3) pupa, all much enlarged. Heavy lines show natural size. (Original.)

fatal to the drone. The queen soon returns to her hive with the genital organs of the male still attached, but these soon fall off or are removed by the workers. One fertilization is enough to impregnate a queen for her entire life, which usually lasts several years. A day or two after copulation the young queen becomes conspicuously larger than the workers and begins to lay eggs.

The age at which the virgin queens mate varies in different localities. In the United States a queen usually mates in from five to ten days after emerging from her cell. At Singalong, Manila, during the last three years, the writer has found that the queens mate in from 10 to 13 days. He has a record, too, of one queen that did not mate until twenty days. One reason for this longer period may have been the relative scarcity of drones at Singalong, there being only a few colonies there.

THE HIVE

The home provided for the bees is called a hive and all the bees in one hive constitute a colony, which is independent of all other colonies. Each colony has its own peculiar odor which is easily detected by every other colony. Under normal conditions bees from one hive are unwelcome in other hives; they are either driven away or killed by the inmates, if they attempt to enter. A knowledge of these facts is important in connection with the mixing or uniting of colonies.

Mention has been made of the old kinds of hives. These have mostly given way to the so-called modern or Langstroth hive named in honor of its inventor.

A modern beehive can best be understood by looking at the accompanying diagram. Essentially it consists of a box, called the brood chamber, which contains movable frames—usually ten—so spaced as to leave room for the passage of the bees. To the frames are fastened the combs of the bees, that is, the wax processes made by the bees. These consist of hexagonal cells in which the young of the bees are reared. In these combs are also the honey and pollen that the bees use for feeding the young. As stated previously, with these movable frames, the combs and the bees—in short, the whole hive—can be manipulated with the least disturbance to the insects. Beneath the brood chamber is a board, the bottom board, which provides an opening for the bees to enter, and beneath this is the hive stand and alighting board in front to make easier the entrance of bees returning loaded with either nectar or pollen. On top

of the brood chamber is the cover, to protect the bees from the weather and their enemies, and to keep the chamber dark. Usually there is an inner cover which exactly fits over the top of the brood chamber, but this is not always necessary.

In modern beekeeping honey is not obtained from the brood combs; for although considerable surplus honey is stored by the bees in the upper portion of the combs this can not be extracted without damaging the combs and even killing some of the brood. What is done is to put another box, called a super, on top of the brood chamber or the hive body. The super may be either an extracting super or a section super, depending upon the way in which the beekeeper wishes to harvest the honey crop. Supers are usually shallower than the brood chamber or hive body, but another hive body may also be used as an extracting super with its corresponding frames.

The extracting supers contain shallow frames usually called extracting frames. They may either have complete combs, that is to say, that they have previously used, or they may be new, in which case they should have either strips of comb foundation called "starters," or complete sheets, preferably the latter—to save time and energy for the bees and honey for the beekeeper, and furthermore to insure stronger and better-formed combs.

Section supers contain small wood frames or boxes called sections, and these are in turn held together by other frames called section holders, each provided with comb foundations.

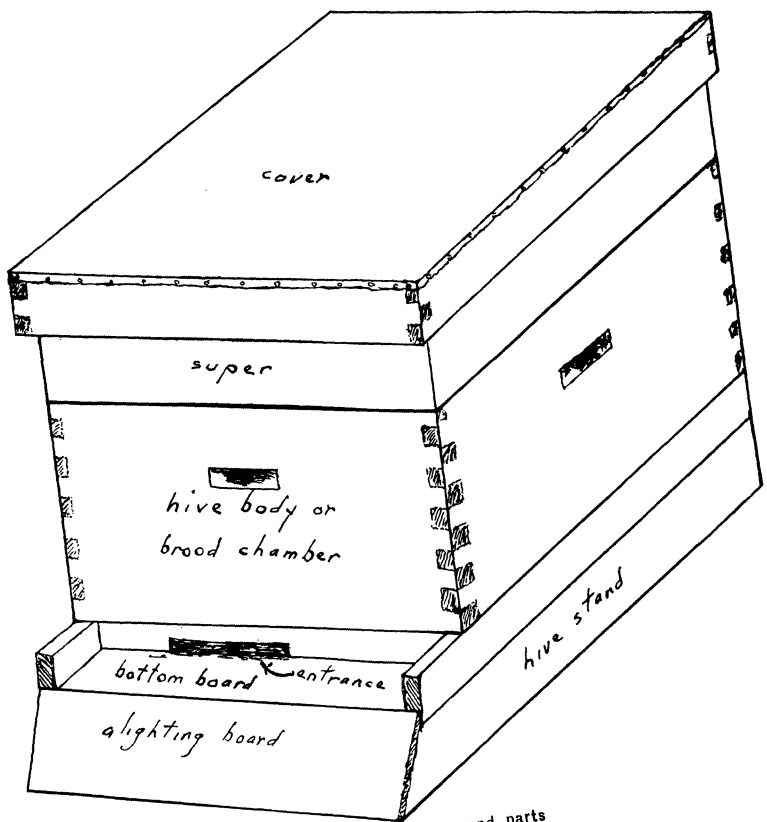
A device called a queen excluder, which allows only worker bees to pass, is placed between the brood-chamber and the super. The purpose of this is to confine the queen bee to the lower box or brood-chamber for the egg-laying, so that what the beekeeper gets in the super is only honey. Several extracting supers may be placed on top of the brood-chamber, depending upon the locality, that is, where there are plenty of nectar-yielding plants and where other ideal conditions for beekeeping exist, such as good climate, and scarcity of bee enemies.

COLLECTING AND MARKETING THE YIELD

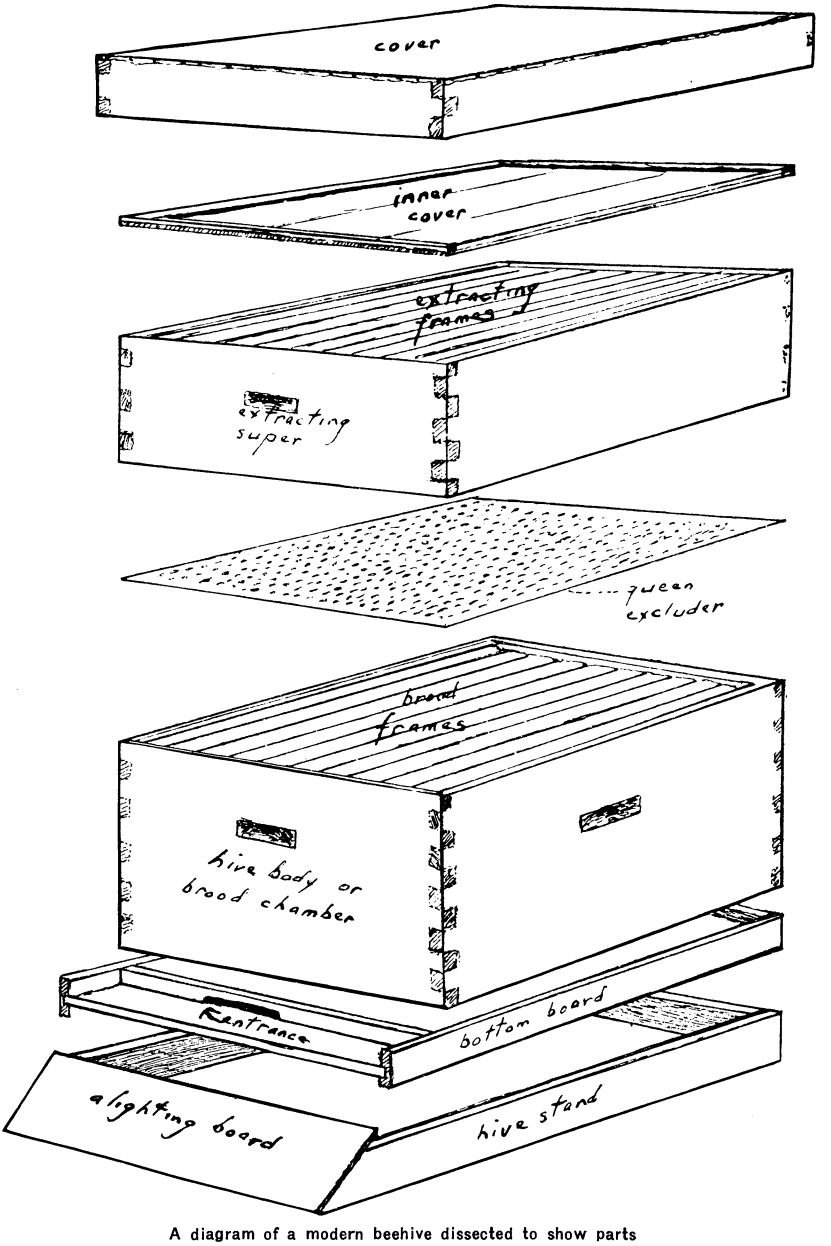
As soon as the frames or sections, as the case may be, in the supers are filled with honey (the cells of the combs should be completely sealed) they are ready to be removed from the supers and have the honey extracted, if extracting frames are used.

To clear the super and the frames or sections the queen excluder is replaced temporarily with a board with a Porter

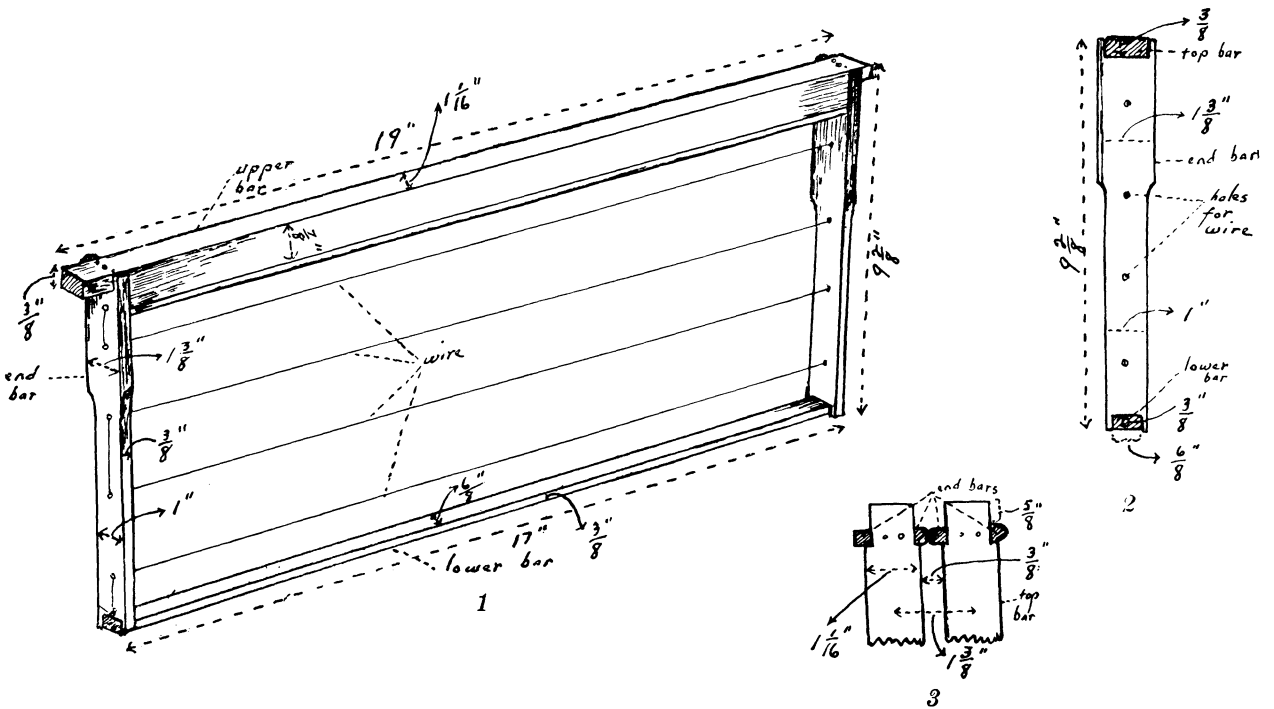
PLATE XXXVI



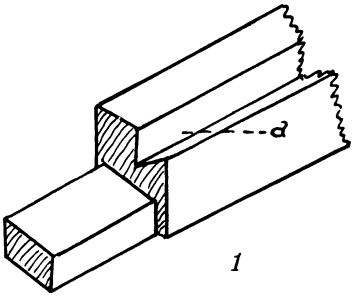
A modern beehive and parts



A diagram of a modern beehive dissected to show parts



(1) A modern brood frame (Hoffman frame) showing parts and dimensions in inches; (2) end view of the same; and (3) top view of the ends of two frames showing dimensions and spacing



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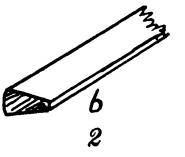

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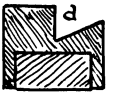

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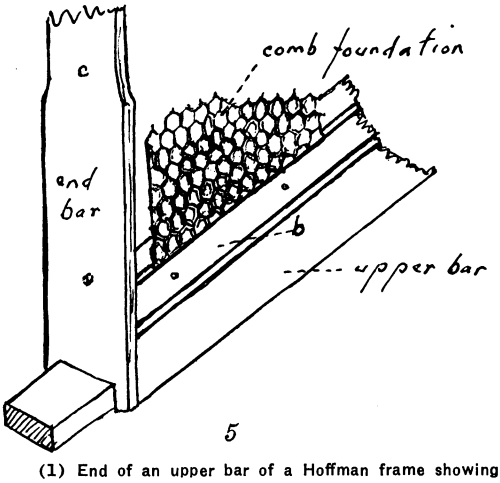

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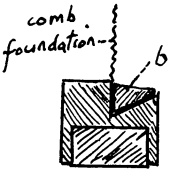

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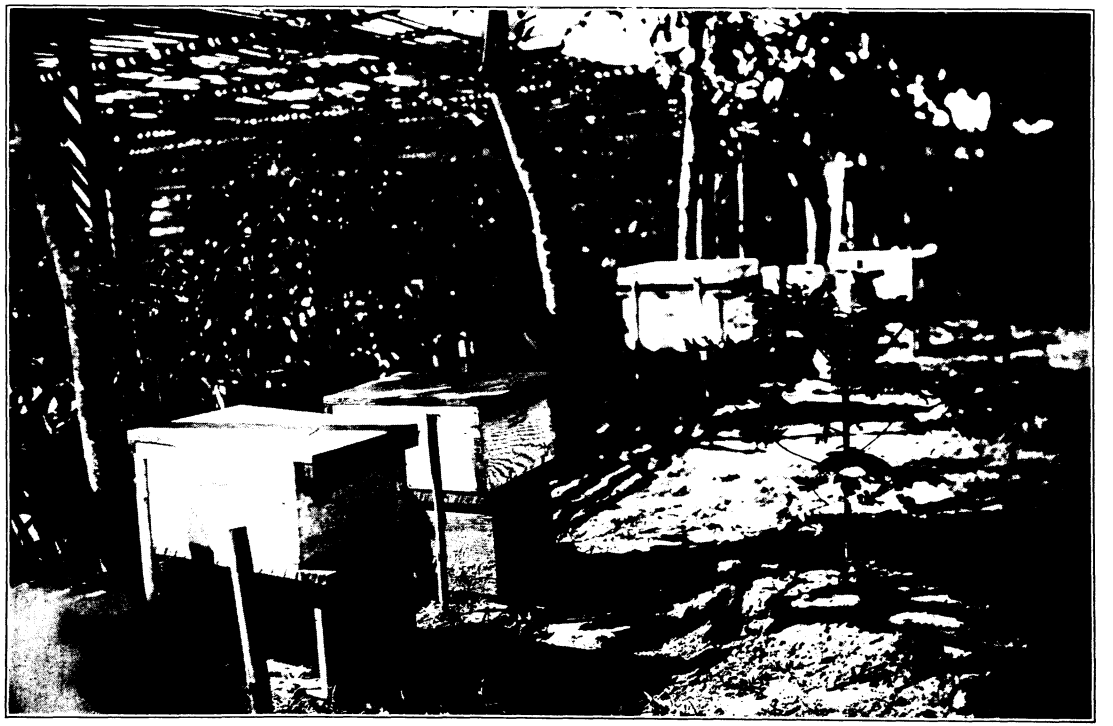
(1) End of an upper bar of a Hoffman frame showing cut *a* in which the comb foundation is inserted; (2) triangular piece cut from *a* and nailed to the upper bar to hold the comb foundation; (3) end view of an upper bar showing cut; (4) end view of an upper bar showing triangular piece in position; and (5) end bar and upper bar, the triangular piece and comb foundation in position.



Hives of Italian bees at the Singalong Experiment Station, Manila. The hives rest on nails driven into petroleum boxes. The nails are smeared with tangle-foot to prevent ants from climbing

bee escape (the use of this device is explained under "equipment"). The super should be free from bees in about twenty-four hours and may then be lifted from the hive and later replaced, if necessary; only those frames or sections that are well filled with honey may be removed and these replaced with new or empty ones. After the operation the escape board should of course be removed and the queen excluder returned. By using extracting frames instead of a bee escape, the bees can just be swept off with a brush especially made for the purpose, but it is always better to use a bee escape so as not to irritate the bees and perhaps injure some of them.

In extracting the honey from the frames the cells are capped with an uncapping knife previously heated and the frames placed in a honey extractor. After the frames are emptied they may be returned again to the supers to be refilled by the bees with honey.

How the money is to be produced and marketed, whether as comb honey, extracted honey, or chunk honey (chunk honey is a mixture of comb and extracted honey), depends upon the beekeeper—the market being his guide, if he is in beekeeping as a business.

HIVE MEASUREMENTS

The hive body.—A standard or ten-frame hive body has the following inside measurements: length 19⅛ inches, width 14⅛ inches, and depth 9⅞₁₆ inches. Near the upper inner margin of each end board is a rabbet on which the frames are supported.

The frames.—The frames (Hoffman frames) are 19 (this is the length of the top bar) by 17 and 9⅜ inches (the length of each end bar). The top bar is about seven-eighths inch thick and 1⅛₁₆ inch wide. The projecting ends by which the frames are supported in the hive are each five-eighths inch long. Each end bar is 9⅜ inches long, 1⅜ inches at the upper end, 1 inch at the lower and is three-eighths inch thick. The lower bar is six-eighths inch wide and three-eighths inch thick.

The distance between the frames from center to center is 1⅜ inch and the space between each two frames for the bees to pass is three-eighths.

The supers, frames, and sections.—The ordinary supers are of the same size as the standard hive body except as to the depth. The ordinary extracting super is 5¹¹⁄₁₆ inches deep and the frames are 17 by 5⅜ inches. There are usually two kinds of section supers, these being 5¹¹⁄₁₆ inches and 4¾ inches deep, respectively.

Sections are of two kinds, plain section and bee-way section. These are sold in several sizes but the most common are 4¼ x 4¼ x 1⅞ inches wide and 4¼ x 4¼ x 1½ inches wide.

WIRING THE FRAMES

To give strength to the comb it is the practice among modern beekeepers to wire the frames, especially the extracting frames. To do the work faster they usually use a machine called a "wiring device." The wires are imbedded into the comb foundations by means of the device called a "wire imbedder." This is heated and passed over the wires. In big apiaries in the States imbedding is done by electricity.

YIELD

To give an idea of what may be expected in the Philippines and for purposes of comparison, it is well to include here some data regarding the yield per colony in the United States. Forty pounds is considered a fair average in that country for the season, that is, for that spring and summer, lasting four to six months, depending upon the locality. In some of the best honey-producing sections of that country, such as California, New York, Colorado, Wisconsin, Iowa, etc., some exceptional colonies may produce about a hundred pounds or over.

In Haiti, a tropical country, it is said that bees yield on the average from 50 to 65 liters (about three petroleum canfuls) of honey per colony per year.

Other things being equal the *yield depends upon management.*

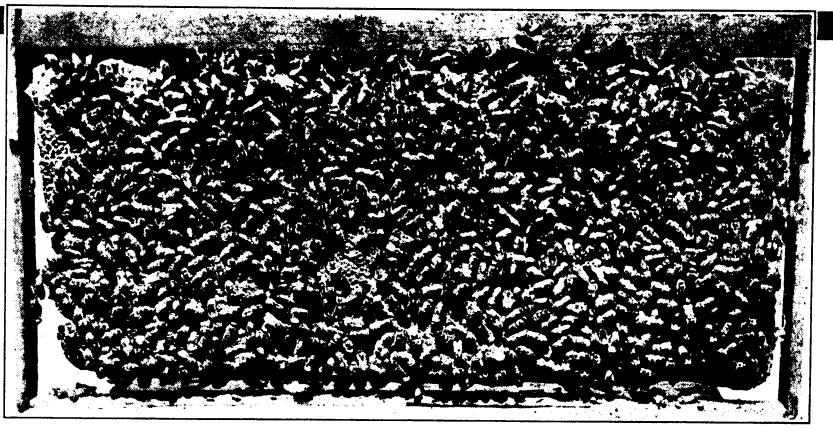
PRICES OF HONEY

The price of honey depends upon the quality which is based on color and flavor. In the United States the average price for extracted honey varies from less than 10 cents a pound in some States to about 20 cents in other States. Comb honey usually sells higher, that is, around 20 cents a pound, but seldom, if ever for less than ten cents.

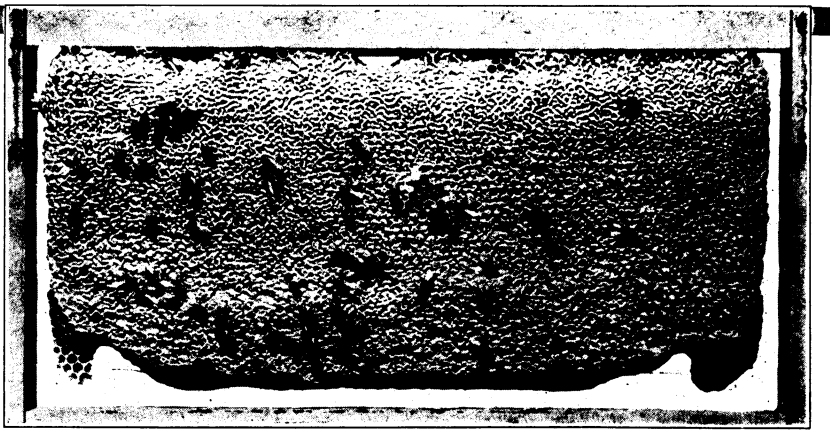
As with other commodities, the prices of honey of course fluctuate, being dependant in part upon the supply.

SWARMING

As stated elsewhere swarming is the natural way for the increase of the species. It usually takes place during the period of honey flow and is therefore objectionable from a commercial standpoint. When bees swarm they make a peculiar noise, whirl in the air, and reveal much confusion, but after a while they



(*a*) A brood comb of Italian bees



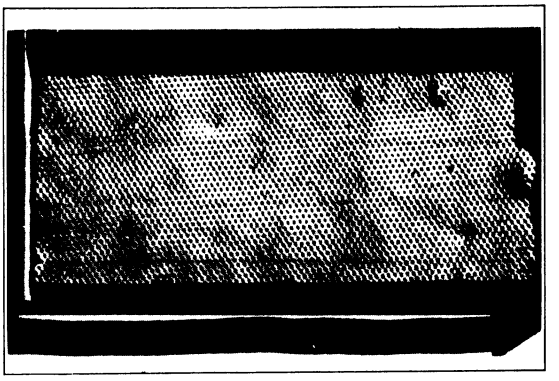
(*b*) A comb of Italian bees containing sealed honey. The frame is wired so as to strengthen the comb

(*a*) Smoking the hive prior to examining the combs

(*b*) Examining a comb of Italian bees. Note how the frame is properly handled. Note also the veil and gloves worn by the person.

(*a*) Portion of a comb of Italian bees showing bees and brood. Note queen cells at (*a*) and (*b*)

(*b*) A glass observation hive made under the writer's direction. This is useful in studying the life and activities of honey bees. The super or upper compartment contains sections with comb foundations.



(*a*) A frame with comb foundation. Note the bases of the future cells and the wires imbedded in the foundation

(*b*) Frames of Italian bees at Singalong resting against a hive while it is being examined. Note the bees and brood and sealed honey.

will settle on any convenient place, such as the trunk, or a branch or twig of a tree or on a wall or a post. These swarms, if not promptly caught and hived, will be lost to the beekeeper, as they will later fly away and settle permanently in some place of their own choosing. It may be the hollow of a tree or somewhere in a house or some other place from which it will cause trouble and inconvenience to dislodge them.

When bees swarm they are gorged with honey and are not prone to sting. When the swarms happen to settle on a twig, the twig may be cut off and the bees slowly shaken into a hive containing frames. If on a branch or trunk of a tree or on a wall or post the bees may be brushed into a box, bag, or cage and hived. If the bees persist in swarming the queen may be caught and her wings clipped.

Before swarming the bees will have built queen cells or a young queen will have emerged. (The old queen leaves the hive with the swarm.) If a new colony is not desired and the beekeeper wishes to restore the colony to its original size he may return the bees to the hive from which they issued. Before doing so, however, the queen cells or queens that might have emerged may be either removed or destroyed or used to requeen other colonies; for queens reared under a swarming impulse are known to be of good quality. A beekeeper should not rely on natural swarming for new queens and the increase of his Italian bee colonies, however, as this method being troublesome, may cause the loss of many bees. Swarming weakens the colony and thereby lessens production. Therefore the beekeeper should make efforts to prevent it. He should watch the hives for signs of swarming. For one thing, before swarming worker bees cluster at the entrance of the hive. This is not, however, always a safe index, as when it is hot bees will cluster at the entrance anyway. To make certain it is better to look at the combs and if queen cells are present you will know that the colony is likely to send off a swarm within a day or two. To prevent swarming the beekeeper should cut off the queen cells and either use or destroy them, or remove the old queen and use her to requeen any other colony or start a small colony, as before said. (A small colony is known among beekeepers as a "nucleus.") To do this one or two brood combs may be taken from the most populous colony, and these replaced with empty brood combs. The former should then be placed in an empty hive together with the queen, but she should be inclosed in a cage called an "introducing cage." This is to save her from being

killed by the bees which will attack her while she is yet a stranger. After 24 hours—better 48 hours to be safe—she can be released, since the bees will have by then accepted the prisoner as the queen.

In case this plan is followed, that is, if the old queen has been removed and the queen cells left in the hive to allow the bees to rear a new queen, the beekeeper should watch for another swarm. As described previously elsewhere, after the first queen has emerged the bees destroy the remaining queen cells. Sometimes, however, when the bees are strongly under the swarming impulse they allow a second queen to emerge and the first queen accompanies a swarm, leaving the younger queen behind. Several swarms may issue after the first swarm, depending upon the size of the colony and the number of queen cells. Such swarms are usually called "afterswarms." Afterswarms being unprofitable and causing the beekeeper much trouble, they should be prevented by removing all the queen cells except one.

Overcrowding is believed by beekeepers in other countries to be one of the causes of swarming and they have tried using bigger hives. However, bees may still swarm, if not properly attended to.

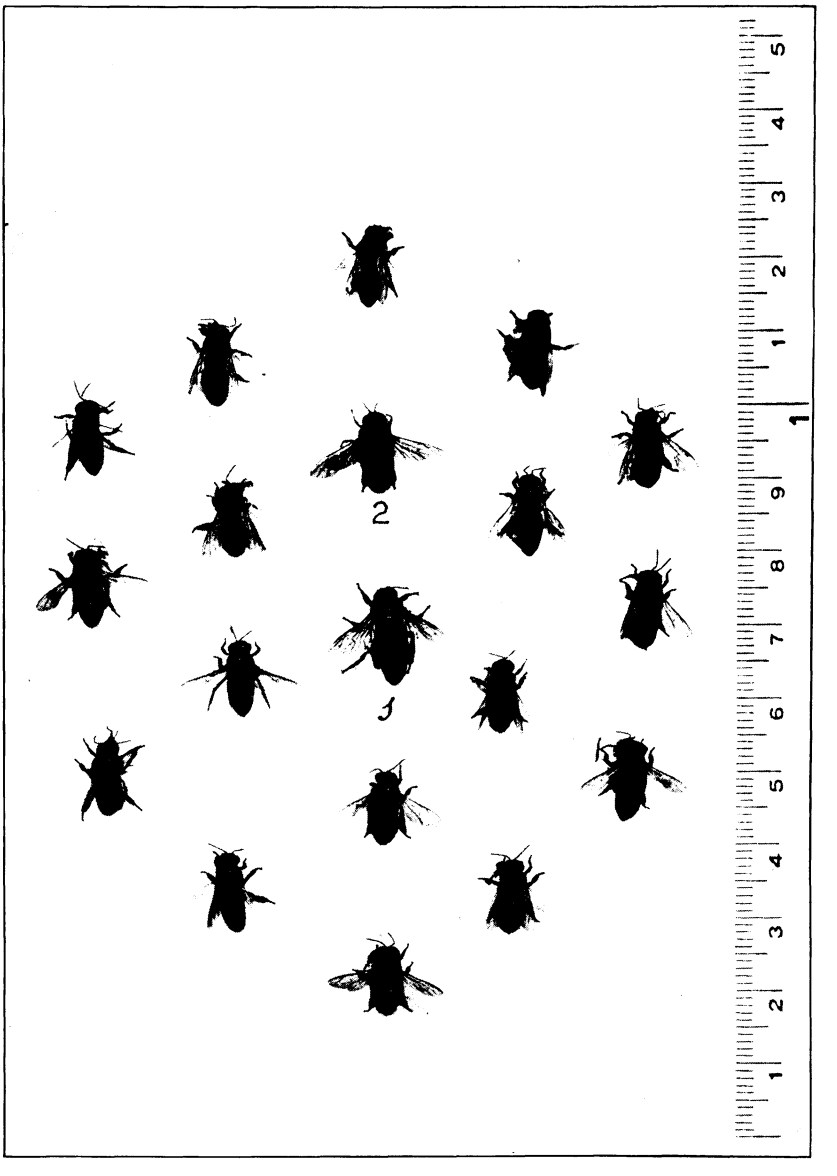
Another way of preventing swarming is to clip the wings of the queen so that she can not fly away.

Since swarming is important it cannot be too strongly emphasized that the beekeeper should inform himself as thoroughly as possible regarding this phase of bee life.

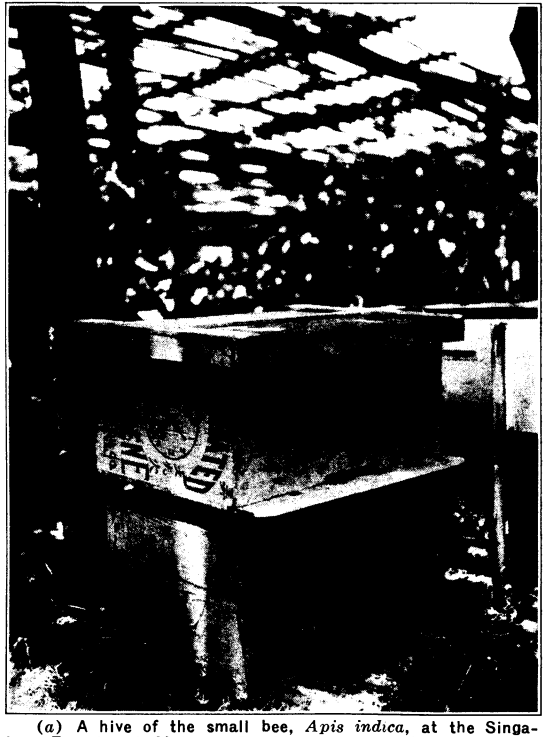
BEEKEEPING IN THE TROPICS AND ITS POSSIBILITIES IN THE PHILIPPINES

The Italian bee has been introduced from temperate countries into many tropical countries like the Hawaiian Islands, Guam, Mexico, Cuba, Porto Rico, Haiti, and the Dominican Republic and Jamaica, and is quite well established in most of them. Some of these export honey, especially to the United States, where there is a great demand for this product. In some of those countries modern beekeeping is practiced due largely to the efforts of American beekeepers.

In the Philippines honey and wax are collected from wild bees, especially from the giant bee, a variety of *Apis dorsata*, and a small bee, *Apis indica*. Most of the honey gathered is consumed locally and very little, if any, is shipped out of the Philippines. A little amount of wax, chiefly from the former,



The small local bee, *Apis indica*: (1) a queen, (2) a drone, and the rest are workers



(*a*) A hive of the small bee, *Apis indica*, at the Singalong Experiment Station. The hive was made from petroleum boxes. It rests on nails driven into a petroleum box. The nails are smeared with tangle foot to keep ants away.

(*b*) A swarm of small bees, *Apis indica*, on a trellis. The man in the picture is looking for the queen bee to catch her prior to hiving the swarm.

is exported. The former species *A. dorsata,* builds its comb in the open usually suspending it from the trunks or branches of trees. It yields quite a large amount of both honey and wax of good quality, but because of its habits there is little hope of its being cultivated, that is, hived. Moreover, it is fierce and attacks the intruder on the slightest provocation.

The smaller species, *A. indica,* builds its comb in cavities in houses, in holes in stone walls, and in cabinets, in boxes, in hollows of trees—in short, in any place that affords it protection; so it can be cultivated or hived, as is done in India. It does not yield as much honey and wax as the giant bee or the Italian. Suggestions as to how to hive a colony of this bee are given elsewhere in this paper.

Although the Italian bee is not as yet established in the Philippines, yet it has been shown by the Bureau of Agriculture that it can be raised and easily increased here, and can be expected to yield fair returns *if raised and well cared for in a good locality,* such as in the coconut provinces, as in Laguna, Tayabas, etc., for the coconut palm is a well-known source of honey. It is the main source of honey in Guam, a tropical island, which, according to authorities, is well stocked with bees. It may be added in passing that all the Italian bees in Guam are said to have descended from a single colony imported from Hawaii. Very often farmers, planters, and other individuals in the coconut sections of this country, report that they have collected considerable amounts of honey from one of the local bees—*Apis indica*—which are common in the coconut regions, and are very valuable in the pollination of that palm, by the way. The guava is another possible source of considerable amount of nectar for it grows in abundance in many parts of the Islands.

In the experience of the writer for several years now of actual work with the Italian bee, even in Manila this imported bee can be made to produce some honey for home use from the flowers of ornamental shrubs and trees in the city (the most important source of nectar and pollen in Manila is a leguminous tree botanically known as *Peltophorum inerme;* the bees also gather nectar and pollen from "bunga" (*Areca catechu*), coconuts (*Cocos nucifera*), and "narra" (*Pterocarpus indica*); the bees also gather much pollen from corn; provided the beekeeper is willing to give the necessary care to the bees and supplies himself with the proper equipment. Of course, as regards beekeeping on a commercial scale for an income, the city, including its environs, is not a suitable place because of the high cost

of labor and comparative scarcity of nectar-yielding plants. Interested parties had better look to the interior provinces, like Laguna and Tayabas, where the coconut palm covers extensive areas; for naturally the prime essential in beekeeping is the presence of extensive areas of one or several or several kinds of nectar-yielding plants, and the coconut palm is one of these.

HOW TO START BEEKEEPING

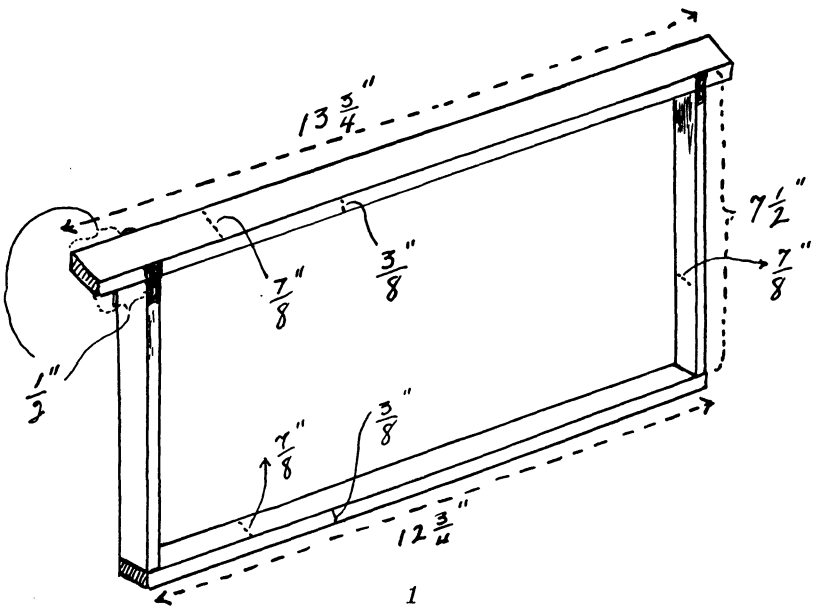
Although the possibilities of beekeeping in the Islands are quite bright, beginners are strongly advised to start with a few colonies, and gradually increase these as they acquire experience, since there are many important local problems yet to be solved here, such as the most important beekeeping regions, markets for honey, prices and transportation, the relation of climate to the production of honey, the important sources of honey, besides those already mentioned, and bee enemies. They should also read books and pamphlets on beekeeping to acquire the necessary information as to the life-history and habits of bees and the proper manipulation of the hives. And furthermore while the reading of books is strongly advised for would-be beekeepers the actual watching of all the operations is also strongly urged.

What is said to beginners as regards starting beekeeping on a small scale should also be said to experienced beekeepers who may think of starting beekeeping as a business in the Philippine Islands. *No greater mistake could be made than to go into the industry on a big scale without first experimenting in a small way, and obviously people should be discouraged rather than encouraged from inviting failure by any such injudicious step.*

WHERE TO OBTAIN ITALIAN BEES

There are as yet only a small number of colonies of Italian bees in the Philippines, and the writer does not know if the owners care to sell any of these, or if they could be prevailed upon to rear "nuclei" for interested parties. From such nuclei, however, any one so minded can build up an apiary in time.

Individuals, firms, corporations, etc., that desire to possess a number of colonies of Italian bees soon are urged to buy them either from the Hawaiian Islands or Guam, rather than from the United States or Europe, not only because that would be cheaper but because more bees would survive the trip, the distance being so much less and also because of the absence, so far, of certain serious diseases of bees, as the American and European foul brood, so common in the States, and the European foul



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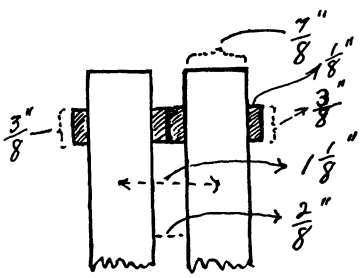

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(1) A frame for the small bee, *Apis indica*, showing dimensions in inches; (2) top view of the ends of two frames to show spacing.

brood and the Isle of Wight disease in Europe. This fact should not be overlooked so as to protect a future industry.

In the United States, bee colonies are usually sold at about ten to twenty dollars (twenty or forty pesos) a colony; they can probably be bought at about the same price or even less in the Hawaiian Islands or in Guam.

In buying bees from those countries the purchaser should demand:

1. That the colonies should be populous, that is, the brood frame should be well covered with bees.

2. That the queens should be good layers, sound, and the younger the better. The first point is a good sign that the queens are good layers. However the buyers should examine the queens to see that they have not been injured.

3. That there should be a sufficient store of honey in the brood combs for the bees while in transit.

4. That there should be few or no drones in the colonies, for they consume too much honey that could be otherwise utilized by the workers.

The best time to ship bees to the Philippines is after the rainy and typhoon season; that is, in October or early in November.

EQUIPMENT

The following are among the most important things needed in beekeeping. They may be obtained from manufacturers in the States:

1. A sufficient number of hives (brood chambers as well as supers and frames) for ready use. These may be purchased from dealers in the States or the beekeeper can make them himself. It is important, however, that they should be of standard size (see measurements of standard hive) so that the frames can be interchanged when desired.

2. A sufficient supply of comb foundations. Comb foundations are thin sheets of wax that contain the bases of the cells of the future comb. These are fastened to the frames and the bees will start building their combs on these. As has been stated, the bees consume much honey in building the combs. The foundations save time and energy for the bees and honey and money for the beekeepers.

3. A bee smoker. The purpose of this is to make the bees gentle. They are frightened by the smoke, gorge themselves with honey, and are thus less inclined to sting.

4. A bee veil and gloves. These are indispensable to the beekeeper. Though the bees can be examined without a veil and gloves it is always good to wear them to be on the safe side.

5. Hive tools. These are made of iron. Usually the frames are stuck to each other by the bees by means of "propolis" (a sticky resinous substance gathered by bees from plants) and it is thus hard to lift them up without jarring the bees and thus irritating them. Hive tools are useful in loosening frames as well as the supers and covers and to prevent unduly disturbing the bees.

6. Queen excluders and Porter bee escapes. These are very convenient. The Porter bee escape is a device which allows the passage of the bees in only one direction. It is fixed to a board placed between the brood chamber and the super, the purpose being to clear the super of bees as soon as the honey in that super is ready to collect. Bee escapes are especially useful in the production of comb honey.

7. Honey extractor. When honey is produced in large qualities this device is extremely useful.

There are other more or less important articles and devices for beekeeping, such as knives for uncapping honey queen cages, queen traps, etc., that the beekeeper can find described in bee books and catalogues.

BEE ENEMIES

The common red ant (*Solenopsis geminata*) is the commonest pest to be guarded against here in the Philippines. It can easily be prevented from invading colonies of Italian bees by placing the hives on bamboo or wooden platforms the legs or posts of which are smeared with tangle-foot or some other sticky material. Rags saturated with crude oil or petroleum may be used instead.

Another way is to set the hives on nails or spikes driven firmly into wooden frames or boxes and smear the spikes with tangle-foot.

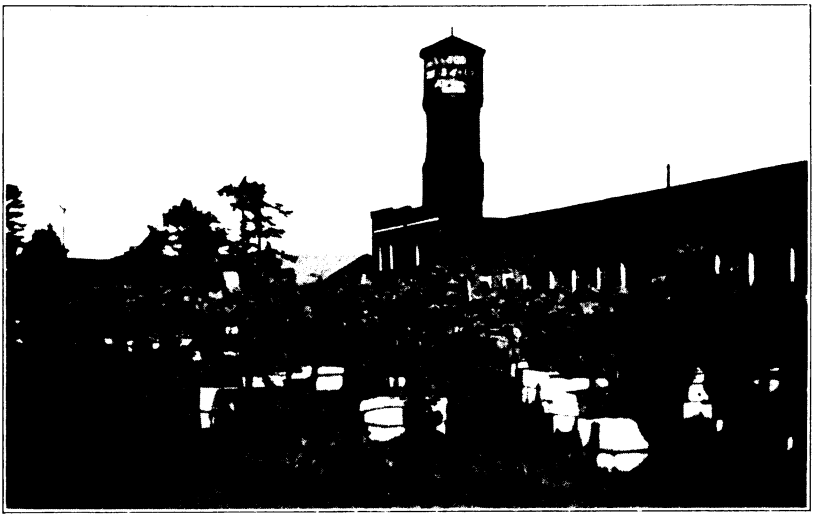
Another method is to set the hives on concrete stands with gutters along the margin, but there is the expense to consider.

Efforts should also be made to kill the ants. This is best done by injecting carbon bisulphide or calcium cyanide into their nests. Instructions as to the use of these can be obtained from the Bureau of Agriculture.

Wax moths, the larvæ of which attack the combs of the bees, sometimes become very troublesome. If the bee colonies are

(*a*) A modern apiary in the United States. One of the apiaries of the Dadant and Sons, Hamilton, Illinois. (Courtesy of the Dadant and Sons, September, 1921.)

(*b*) Part of the factory of bee supplies and appliances of the Dadant and Sons, Hamilton, Illinois. (Photo by the writer, September, 1921.)



(*a*) Part of the home apiary and bee supply factory of the A. I. Root Co., Medina, Ohio

(*b*) Part of one of the queen rearing yards of the A. I. Root Co., Medina, Ohio

strong, however, they are not bothered by the moths. These wax moths will do most damage to frames with combs and also to comb foundations in storage if neglected. It is well to store these in tight or properly screened boxes.

There are usually two kinds of moths that attack wax; these are known as *Galleria mellonella* and *Achroia grisella*. The latter is usually called the lesser wax moth. At Singalong, Manila, moths found attacking the combs seem to be of the latter species. This identification needs to be verified, however.

Robber flies have been observed to prey on Italian bees, but so far as observed they are not so numerous as to require attention. Spiders have also been noted attacking the bees, but like robber flies they are not very numerous.

Certain birds are said to catch Italian bee workers, but this charge needs proving before any recommendations can be made.

During the rainy season parts of the combs are liable to get moldy, especially when the colonies are somewhat weak. This can be overcome by providing the hives with good covers ("telescope" covers with tin roofs) so that rain water will not drip in. "Excelsior" covers are not good during the rainy season as rain water is liable to drip in and the interior of the hive will become so damp as to encourage the growth of molds.

Certain serious bee diseases, some of which have already been mentioned elsewhere, exist in other countries. The entrance of these should be prevented by a law and beekeepers should coöperate in its enforcement.

HOW TO HIVE THE SMALL NATIVE BEE (*Apis indica*)

Although the writer would recommend the Italian bee, as there are but few at present here, suggestions as to how to hive the small native bee are here given.

Since this bee is smaller than the Italian bee, some of the most important appliances and materials used in handling the Italian bee cannot be used with satisfactory results. For instance, if the frames used for the Italian are used, as they are, the space between them is a little too wide so that the small bees will build combs between the frames, thus making it impossible to lift the frames without destroying those combs and irritating the bees. The comb foundations for the Italian also cannot be used for the small bees, as the bases of the cells are too big for them and they will build irregular cells. The diameter of the cells of the small bee is about $\frac{5}{32}$ of an inch, while that of

the Italian is 7/32. So, too, the queen "excluders," do not exclude the small native queens.

HOW TO MAKE A HIVE FOR THE SMALL BEE

Hives for this bee can be easily made out of petroleum boxes. One of the broad faces of the box is made the top of the hive. The inside measurements of such a hive are approximately as follows: length, 19 5/16 inches (48 centimeters); width, 14 inches (35 centimeters); and depth 9½ inches (24 centimeters). About an inch below the upper inner margin is nailed a board one-half to one inch wide and about half an inch thick to support the frames.

The frames * can also be made out of petroleum boxes. The top bar is to be 13¾ inches long, seven-eighths inch wide, and about three-eighths inch thick. Each end bar should be 7½ inches long, seven-eighths inch wide, and of the same thickness as the top bar. The lower bar should also be of the same thickness and width as the top bar. A piece of wood one-eighth inch thick, three-eighths inch wide, and about 1 inch long should be nailed to each end bar so that when the frames are placed together in the hive the distance between each two frames from center to center will be 1⅛ inches and there will be a two-eighths inch space between them, which is about the proper distance so that the bees will not build combs between the frames.

The hive cover may also be made from petroleum boxes and should fit the hive well and if the hive is to be placed in the open the cover should have a tin roof so that water will not drip in. If paint is available it is well to paint the exterior of the hive.

HOW TO SECURE SMALL COLONIES OF THE BEE

One way of securing colonies of this bee to start with is to watch for swarms and catch and hive them. To get the bees used to the new home it is well to close the entrance of the hive for at least twenty-four hours and to induce them to build combs, the lower surface of top bar of each frame should be provided with wax, as starters. This is done (in the absence of comb foundations) by pouring melted wax along the middle in a straight line. Before doing this, sugar or syrup solution should be sprinkled into the hive to feed the bees. It is not advisable to clip the wings of the queen as she may not have been fertilized.

* The Italian bee hive and frames may be used, provided the frames are cut down to suit the small bee.

Another way of securing colonies, a much surer way, is to look for their homes. As stated these bees build their combs in any place that will afford them protection—in boxes, in cabinets, in cavities, in walls, and in houses, and in hollows of trees, etc. To transfer a colony to a hive the combs should be removed one by one, cut down if necessary, to fit the frames and each tied to a frame by means of string and should then be arranged in the hive. No combs should be left in the old dwelling of the bees. Bees that are still clinging to combs that have been discarded, as well as those that are still in their old home, can be forced to join the other bees already in the hive by smoking them out. The hive should be placed as close as possible to the old home of the bees so that they can easily find it. After the bees are all in the hive, it can then be placed wherever it is wanted. It is well to close the entrance of the hive for about one day so that the bees will forget the old home, after which they can be let loose. The bees will soon attach the combs to the frames and the strings with which they are tied can then be removed.

It sometimes happens that laying queen will leave the hive and some of the bees will swarm with her. If this occurs she should be caught and her wings clipped so as to prevent the bees either from swarming or make it easy to get them to return to the hive.

The lack of proper appliances, comb foundations in particular, is a serious handicap to raising this bee. This lack will not be supplied until there is a sufficient demand for these bee supplies so that it will be profitable to manufacture them. Until then the honey will have to be collected largely according to the old way; that is, by cutting off portions of the combs containing sealed honey. This is of course laborious and not so profitable as honey gathering when comb foundations are used. But even if nothing else modern can be had movable frames can—they can be made as before said—and will be found well worth the time and trouble.

HOW TO INCREASE THE NUMBER OF COLONIES OF THE SMALL BEE

This can be done in either two ways:

1. Watch for more swarms and hive them, as described.

2. Rear queens artificially and divide the colonies on hand. The best time to do this is when the bees are rearing much brood and storing considerable amount of honey.

At this time drones are reared and the frames should be examined for the presence of queen cells. The frame or frames

containing these and with worker bees on should be removed and placed in a new hive.

A queen will emerge, the bees will destroy the remaining queen cells,* in case there are several, and the colony will build itself. Instead of removing the queen cells, the old queen may be removed and placed in the new hive together with one or several combs with brood and bees, from the first hive. The bees in the first hive will soon get themselves a queen.

If there are no queen cells, one or several frames with bees and with young brood may be taken out and placed in a new hive. When the bees notice that they are queenless they will build queen cells and will rear a queen.

These methods can also be used with the Italian bee.

UNITING OF COLONIES

As stated, when bees become queenless they are doomed to die unless there is young brood in the hive from which they can rear a queen. Even if there is, it sometimes happens that the queen is lost in the nuptial or mating flight and the bees will not be able to rear a queen because there is no more brood in the hive, and so the colony will gradually die out. To save the colony it may be either furnished with laying queen, or young brood, provided there are drones. If there are none the only thing left to do is to unite this colony with another colony with a queen. Doing this has a double advantage, for not only is the queenless colony saved but the other is also strengthened. Uniting the colonies directly may cause disastrous results, for the bees being strangers to each other, as before intimated, will fight and kill each other.

To mix the bees and prevent their killing each other, an easy method is to place the hive containing the queenless colony over the other and put a newspaper between them. The bees in both hives will gradually get acquainted with each other, acquire a common odor, eat their way through the paper, and mix freely. The newspaper can then be taken out and top hive either removed or replaced with a super, if necessary.

In extensive honey production weak colonies may be profitably united or mixed with strong ones.

ARRANGEMENT OF AND DISTANCE BETWEEN THE HIVES

The question of arrangement and distance is most important when the beekeeper has a large number of colonies.

* These may be saved for other colonies.

It is best to have the hives arranged in rows and not too far apart, to save time and labor. About one and a half meters between the hives and from two to five meters between the rows are convenient distances.

CARE NECESSARY BECAUSE OF CLIMATIC CONDITIONS

Bees need to be protected from unfavorable weather conditions, such as rain and typhoons and too much heat. This is especially true in the case of the Italian bee at the start, when there may be only one or a few colonies and these are especially valuable because of the difficulty there might be of getting more. The hives may be placed under sheds during the wet season. These can be made of bamboo and cogon or nipa, which are easily obtained. Then as the number of colonies increases and the business expands, the sheds may be done away with, provided the hives have good covers, so that rain will not drip into them. Shaded, as well as well-drained, locations are preferable.

The hives should be placed in a slightly inclined position with the entrance a little lower than the rear to prevent rain water from collecting in the bottom of the hive. Neither strong prevailing winds nor direct intense sunlight should be allowed to strike the entrance to the hives. Where the ground is level it is best in most cases to have the hive face the north.

SOME DIRECTIONS FOR HIVE MANIPULATION

1. When examining the hive, stand at the side and not in front of it so as not to get on the way of the bees coming and going.

2. Use smoke moderately. Too much of it is likely to stupefy the bees. Apply a little smoke at the entrance and then at the top, after lifting the cover a little, to force the bees into the hive.

3. The covers are usually glued by the bees to the hive with a sticky substance called "propolis." Loosen them like the supers and frames, with the hive tool before lifting them. Lift the frames by the ends, that is, at the points on which they hang in the hive, and do it slowly to avoid irritating the bees and crushing some of them, especially the queen. Avoid sudden and jerky movements. Do not hold the frames too near your face.

4. Do not handle the hives much. This is a common mistake among beginners. Open the hives only when necessary.

5. Do not open the hive during rainy and chilly weather.

FACTORS ESSENTIAL TO SUCCESS IN BEEKEEPING

1. The bees raised should be good honey gatherers, gentle, disease-resistant, and not much given to swarming. The Italian bee meets all specifications.

2. There should be a good "pasturage" for the bees; that is to say, there should be extensive areas of one or several kinds of nectar-yielding plants. Coconut regions in the Philippines, such as Laguna and Tayabas, would answer this requirement.

3. The beekeeper should have enough of the proper tools and materials.

4. There should be a good market for honey. Prospective beekeepers should carefully study this question before going into beekeeping as a business. They should also consider labor and transportation facilities.

5. The beekeeper should endeavor to acquire all the necessary information about the life and habits of bees and their proper management. In this connection, he should study his locality, paying special attention to the honey flora, the period of honey flow, favorable and unfavorable weather conditions, and study how to take advantage of the former and obviate the ill effects of the latter; and pests and diseases and the natural and artificial methods of controlling these, etc.

6. He should always be businesslike. He should study his market, keep posted on the fluctuations in prices, study his customers and how best he can get and keep their trade at a fair profit, study his bees; and keep records on all these points.

SOME IMPORTANT BOOKS ON BEES AND BEEKEEPING AND THEIR PUBLISHER

1. Comstock, Anna B. How to Keep Bees. This can be obtained from the A. I. Root Co., Medina, Ohio.

2. Dadant, C. P., First Lessons in Beekeeping. American Bee Journal Hamilton, Illinois.

3. Langstroth, L. L. and Dadant, C. P., The Honeybee. The American Bee Journal, Hamilton, Illinois.

4. Maeterlinck, M., The Life of the Bee. This is a well-known literary work by the famous Belgian poet. It can be obtained from the A. I. Root Co., Medina, Ohio. Also from Dodd Mead and Co., New York, N. Y.

5. Miller, C. C., A Thousand Answers to Beekeeping Questions. The American Bee Journal, Hamilton, Illinois.

6. Pellet, F. C., Productive Beekeeping., J. B. Lippincott Co., Philadelphia, Penn.

(*a*) A honey house in one of the apiaries of the A. I. Root Co., Medina, Ohio. The doors and windows are screened so that the bees cannot get in, especially when the honey is being extracted.

(*b*) The bee culture laboratory of the Bureau of Entomology, United States Department of Agriculture, Washington, D. C., at Somerset, Maryland. Some of the beehives are shown in the background.

(*a*) Beekeepers inspecting hives at the United States Bee Culture Laboratory at Somerset, Maryland, during a beekeepers' conference at the laboratory. The bees are primarily used for research work.

(*b*) A beekeeper wearing a veil and broad-brimmed hat especially made for beekeepers. At one of the apiaries of the A. I. Root Co., Medina, Ohio.

7. Pellet, F. C. Practical Queen Rearing. The American Bee Journal, Hamilton, Illinois.

8. Phillipps, E. F. Beekeeping. The McMillan Co., New York, N. Y.

9. Root, A. I. and Root, E. R., The ABC and XYZ of Bee Culture. The A. I. Root Co., Medina, Ohio. (This is published in several other languages, including Spanish.)

Bulletins and circulars.—United States Department of Agriculture Bulletins and those of other countries, especially tropical countries. The most important of these are in our libraries, such as those of the Bureaus of Agriculture and Science.

SOME BEEKEEPING JOURNALS

1. Gleanings in Bee Culture, Medina, Ohio, Monthly.
2. The American Bee Journal, Hamilton, Ill. Monthly.
3. The Western Honeybee, 2823 E. Fourth St., Los Angeles, California.
4. Beekeeper's Item, New Braunfels, Texas.

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